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ABSTRACT

The 38 conference papers in this volume were chosen to exemplify different definitions of, and approaches to, quality, as they are applied in a wide range of educational and training contexts. The papers are: "Designing Organisations That Learn" (D. J. Dicks); "Quality Assurance in a European Context" (D. Alexander, J. Morgan); "'What's in It for Me?'" (C. Hart, M. Shoolbred); "Quality and the Academic Administrator" (C. D. Payne); "Total Quality Management in an Education and Training Context" (B. Ellis); "Performance Management in a Competence Framework" (E. Sauve); "Quality in Further Education: An Unchanging Agenda" (D. Shepherdson); "Defining Quality in Higher Education" (A. Burrows, L. Harvey); "Total Quality Implementation--Cultural Issues and Training" (B. Hurley); "Developing the European Quality Model" (J. S. Oakland, L. J. Porter); 'Strategic Quality Management" (R. J. Newton); "Profits and Pitfalls in Establishing a Qualytechnic" (J. Heap, H. Solomon); "Student Satisfaction and Perceptions of Quality" (P. M. Mazelan and others); "Experiences in the Design and Conduct of Enterprise Audits" (D. Edgar); "Monitoring the Quality of Quality Control Systems" (H. I. Ellington, G. T. N. Ross); "Improving the Quality of a National Curriculum" (I. Musallam, M. Brophy, M. Schilling); "Developing Quality in Education" (R. J. D. Rutherford); "Quality in Course Design" (E. Roper); "Quality Horses for Quality Courses: Matching Students with Courses in Music" (L. Gibbs); "Recognising Quality in Engineering Education" (D. C. Hughes, R. G. S. Matthew); "Exploring Learners' Perceptions of Quality" (D. Miller, P. Funnell); "Concept Mapping, Post-Questioning and Feedback in Distance Education" (R. M. Bernard, S. Naidu, K. Lundgre-Cayrol); "Comparing Chalk and Cheese--Quality in Assessing Work-Based

Learning" (C. Bucklow); "Using Learning Contracts To Enhance the Quality of Work-Based Learning" (I. S. Marshall, M. L. Mill); "Quality of Assessment" (P. Race); "BS5750 for Assessment" (P. Race); "Eating Frogs and Bridging Gaps--Post-Warnock Conditions for Teaching Quality" (C. Colling); "Teaching Quality" (D. Jones, J. Hanson); "Upward Appraisal and Its Implications for Higher Education" (G. McElwee and others); "A Total Quality Approach to Managing CBT Development" (S. G. Shaw, D. R. Shaw); "Towards Quality Management in Training Design" (M. Williams, G. Carr); "Achieving Quality in Networking Interactive Video" (P. Willis, J. Early); "Quality in Modernising Educational Technology" (D. Hawkridge); "Trends and Issues in Educational Technology" (D. P. Ely); "Training Quality and New Technology" (A. R. Bartolome); "Connecting Lectures and Laboratory Learning with CAI" (Y. Araki); "Graphical Routes to Quality Courseware" (P. Barker, C. Lamont); and "Enhancing the Quality of Student-Centered Mathematics" (D. Bowers, R. Burrell). Most of the papers include references. (MES)

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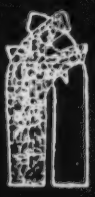

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Aspects of Educational and Training Technology

Volume *XXVI*

Aspects of Educational and Training Technology
Volume *XXVI*

Quality in Education and Training

Edited for the Association for Educational and Training Technology by

Malcolm Shaw and Eric Roper

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Editorial

This volume constitutes the Proceedings of the Association for Educational and Training Technology's 1992 International Conference, which explored "Quality in education and training". The theme is topical in view of the growing Government initiated climate of accountability, performance indicators and monitoring of quality, and in the context of the developing activities of sector-specific agencies such as the Higher Education Funding Council through its quality audit activities and its quality assessment initiatives.

One of the origins of the quality "movement" was the attempt to re-build Japanese industry after World War II. Initially many of the ideas were American, but the Japanese subsequently developed their own approaches to quality. Nowadays the movement is worldwide, and the approaches increasingly differentiated and sophisticated. However, the extent to which ideas and procedures developed in industrial and business applications and in different cultures can be applied to specific education and training contexts is problematic. To take some examples, is it possible and/or desirable in education and training to design "error-free" processes, to get it "right first time", to isolate variables and represent them statistically, to conform to requirements? Isn't education and training a more humane process, in which both teacher and learner are reaching out into what is, for each of them, the unknown? In doing so, aren't they extending the limits of their capabilities and surprising themselves - a process in which error or failure, if not feared or disguised (or eliminated!), can generate powerful insights and contribute to learning?

Whilst acknowledging its problematic nature, much is being done to develop ways of enhancing and assuring quality in education and training. The papers in this volume have been chosen to exemplify different definitions of and approaches to quality, as they are applied in a wide range of educational and training contexts, and to explore some of the issues raised. Although the total quality management perspective is strongly represented, so too are others such as British Standard 5750, fitness for purpose, identifying and meeting the needs of different stakeholders, and empowering the customer or client. Also included are examples of applications of some of these perspectives outside education and training - for example, in commercial CBT development (Chapter 30) - which may (or may not) inspire us to adopt similar procedures in education and training, but which exemplify the methodology. Reflecting the international nature of the conference, several of the contributions are from outside the UK.

The eclecticism of the contributions is inevitable. They have been written by practitioners wrestling with the problems of identifying and delivering quality in specific contexts, sometimes drawing explicitly on theoretical perspectives or attempting to adapt industrial applications of quality to educational settings, but often developing pragmatic solutions in response to institutional and external demands for quality assurance or in addressing day-to-day problems. The contributors demonstrate first-hand knowledge, expertise, originality and familiarity with relevant literature. In presenting their work in ways which vividly capture the richness of their experiences - the problems and struggles as well as the solutions - they help to demystify the search for quality and allow others to make connections with their own experiences and concerns.

The organisation of these Proceedings reflects that of the conference. The organisers and editors struggled with alternative arrangements, but settled for these rather arbitrary divisions. We are aware that many papers could have been included in alternative sections. This is particularly the case with those illustrating applications of technology. We apologise to those contributors who feel that their work has been misplaced! Each

of the sections has an introduction which provides an overview of the papers included.

The timeliness of the conference theme was demonstrated by the number of contributions offered (over 70 were delivered as papers, seminars and workshops, together with poster and exhibition sessions). Such was the response that the editors have been unable to include in these Proceedings all of the conference contributions. They wish to acknowledge here the part played by **all** conference contributors in stimulating and engaging in what was a high quality, detailed and constructive debate. All conference participants were able to find sessions from which they were able to take new knowledge or perspectives, together with practical ideas. The keynote addresses, delivered by Geoff Stanton of the Further Education Unit, John Oakland, Brian Hurley and Dave Müller and Peter Funnell, all provided ideas and stimulated thinking which participants related to and developed in other conference sessions. The editors' thanks are extended to these keynote speakers for providing the "warp" in the "weft" of the conference!

Organising a major Conference, like AETT 1992, requires the help and commitment of a considerable number of people. Whilst it would be absolutely impossible here to name all those who contributed to AETT 1992, it is certainly an appropriate place to single out the following friends and groups for a special mention in view of the extensive and vital contribution that they made to the success of our venture ...

Members of the Planning Group: Graham Cheetham, Katherine Hayes, Bob Matthew, David Pratt and Hazel Solomon.

Our sponsors: Cartwright Brice Office Supplies (Leeds), Kodak Photocopiers Division, Nestle Rowntree Division (York), York City Council Economic Development Unit, York Wines of Sheriff Hutton, Leeds Metropolitan University (Computing Services Unit, Media Services Unit, Enterprise in HE Unit, Communications and External Relations).

AETT stalwarts, but in particular: Henry Ellington, Fred Percival and Roy Winterburn.

Our Conference Team: students (Philippa Allott, Sarah Howson, Caroline D'Attorre and Melissa Labram) and technician - Bruce Knights.

Special thanks are also due to our colleague, Stuart Rawnsley, for his unflagging and always enthusiastic achievements not least with regard to the social programme and sponsorship.

We are sure that all would wish to join us, once more, in saying a really big thank you to the one person on our Team who, above all, seemed able to remain absolutely calm, whilst the rest of us were quietly panicking, and who has done much to organise your editors through the task of producing these Proceedings - Jane Thomas, the conference secretary.

Finally our thanks go to all the contributors and delegates, without whose support we could not have had such a memorable, enjoyable and *QUALITY* conference!

Eric Roper
Malcolm Shaw

Leeds Metropolitan University

Section 1: Perspectives on Quality in Organisations

Contributors here have focussed on a number of theoretical issues and matters of principle that are suggested, in many cases, as necessary conditions for the application of quality approaches in organisations.

The contexts vary widely, beginning with the global concerns outlined in "Designing organisations that learn" by **Dennis Dicks**, who questions the validity of trying to transfer essentially Japanese notions of quality into a British context and culture. This cultural theme is echoed in "Quality assurance in a European context" by **David Alexander and Jim Morgan**, where the context is Europe and the paradoxes and dilemmas inherent in the transfer of some quality indicators across higher education institutions in its Member States.

In "What's in it for me?", **Chris Hart and Michael Shoolbred** focus on the individual organisation and the cultural features that might inhibit or nurture the growth of quality. Similarly, the focus is firmly located in the organisation in **Catherine Payne's** consideration of "Quality and the academic administrator", where factors influencing the implementation of TQM in higher education are viewed from the perspective of the educational administrator. **Barbara Ellis** also describes the necessary conditions for application of TQM in higher education and uses a case study approach by means of illustration.

The role of effective management training in the push for TQM is the theme explored by **Elaine Sauvé** in "Performance management in a competence framework" and this is linked to some contemporary training initiatives. The importance of training is also echoed by **David Shepherdson**, who goes on to describe a large scale training and development initiative across a Local Education Authority.

Finally, the way in which the views on quality of the different stakeholders in education are to be compared and contrasted is the subject of work described by **Alison Burrows and Lee Harvey** in their multi-perspective approach - "Defining quality in higher education: the stakeholder approach".

1 Designing organisations that learn

Dennis J Dicks, *Concordia University, Montreal, Canada*

INTRODUCTION

There is much debate in the U.K. and in North America about the way we organise work. A central issue is the impact of Japanese practices: can they be transplanted? Will they converge towards our methods or not?

This debate arises in the context of a broader argument about the nature of industrial production. Some theorists suggest that the Japanese system heralds a break with the "Fordist" model of mass production: work teams, job rotation and innovation replacing centralised control, task fragmentation, and regimentation or small-firm networks replacing large corporations (Piore and Sabel 1984). Others see it as a transitory phenomenon (Gertler 1988) or even a refined form of Fordism (Dohse et al 1986).

In any case, the current industrial imperative demands flexible response to changes in the business environment, innovation, short design to production cycles, tight scheduling, lean operation and quality control. The Japanese have demonstrated that they can achieve these things; and they have done so by creating organisations that learn, organisations in which comparative advantage is based upon the development and deployment of workers' skills and intelligence (see for example Dore et al 1989; Koike 1988).

How is this done? The evidence indicates that the Japanese approach is systemic, in so far as it integrates values and practices developed in several institutions: the family, school, university, industry and government.

DESIGNING A LEARNING ORGANISATION IN JAPAN

Human Capital: Investing in People

Much has been written about the superiority of Japanese management techniques. However, one could argue that managing in Japan is easier than in North America because human resources are better suited to the tasks at hand. This is because skills development more closely follows the idealized "human capital" model; in short, people are given the information, incentives, and tools to invest in themselves with the promise of future payoffs. These investments are exploited, for mutual benefit, in the ways these skills are developed and deployed in the workplace. Japanese firms thus display what has been called "organisational capital".

In the Japanese context, there are five key elements contributing to the development of human and organizational capital: formal education, recruitment, deployment, remuneration, information transfer.

Formal Education

We have all heard about the rigours of the educational system in Japan. Students spend more hours per day, more days per week, and more weeks per year at school. On average, they are more dedicated than their North American peers to learning. One reason for this is the extreme competitiveness of a large society crowded onto a small island, with virtually no opportunity to move horizontally to other countries. Another reason is the complexities of the language, which require enormous concentration and effort to reach the compulsory level of mastery at the end of high school. After that

point, with entry to a good technical college or university, demands on the student in fact become less rigorous. Students (and parents) are willing to invest their time and money in this process because they know it generally pays off in the trappings of success - money, status, the means to raise a family.

Recruitment

This effort would be lost if the skills produced by the educational system were not recruited into productive work. Graduates are carefully matched to employment opportunities in a highly organised recruitment system working on a national scale. Those from technical colleges flow into the openings for skilled labour, those from universities into the openings for office workers. As part of the effort to have employees identify with the firm rather than with economic classes, distinctions are minimized, so that the technical jobs which we would characterize as "blue collar" have relatively high status in Japan.

Graduates are not recruited for specific positions, but for their potential to contribute to the organization in the long term. Accordingly, the level of recruitment is not tightly bound to economic conditions; and the criteria for selection focus more on attitude, basic ability and willingness to learn rather than precocious performance.

Deployment

Deployment has three key facets: probation, job rotation/working group, job-related training.

Graduates fresh from school enter a period of probation, lasting perhaps three years. This entails a program of activities intended to develop skills and build identification with the group: "boot camps", orientations, and rotating appointments to several relevant parts of the organization. By the end of this period, the new employee and the firm will have assessed the potential for a fruitful relationship and substantial portion of the entrants will have left or been sent on their way by this point.

This pattern of developing skills continues throughout the employee's life in the organization. Employees hired from other firms follow a similar pattern. Training may be organised within the firm, or the employee may be strongly encouraged to pursue courses outside working hours. Job rotation and working in groups not only develop a broad range of operational skills but also instill a clearer understanding of the firm's activities.

Remuneration

One of the glues holding these practices together is the system of remuneration, which blends a number of factors into the payment schedule for each individual: seniority, individual and group performance, and special needs such as family situation, geographical location, commuting distance. Each firm has its own way of weighting these factors, but the basic principles of the so-called "seniority-merit" system are the same: salary profiles follow a roughly s-shaped function (the familiar learning curve) in a sense underpaying the recruit during the probationary period, and overpaying during the period when the demands of raising a family are greatest. The system thus rewards loyalty as well as performance. It also conforms to "human capital theory" (Becker 1964) in so far as payments are lower when the employee is less productive and is in fact benefitting from the skills being instilled at the organisation's expense. Japanese firms

can thus invest in "general" skills because the prospect of higher payments later on serves as the incentive for the employee to remain with the firm.

Information Transfer

If remuneration patterns are the glue that holds the system together, the lubricant that keeps it going is information transfer. One of the most significant features of the Japanese form of organisation is the decentralisation of control over information. Essentially, responsibility for dissemination of job-related information is pushed down to the lowest level possible. The work-team leader, and even team members, are expected to share their knowledge with co-workers. In effect, the day-to-day training function becomes the job of ordinary workers.

Sharing information is one of the most important ways of raising the status of people performing technical jobs. In Japan, "blue collar" work takes on many of the decisional and innovative aspects of "white collar" work.

Organisational Capital

Together, the measures taken in Japan to develop human capital also contribute to an analogous form of investment, "organisational capital". In this case, investment is in organisational form, such that the organisation develops practices which enable it to adapt more easily to changing conditions (Prescott and Visscher 1980). Firms create organisational capital in three ways: by optimising the match between people and jobs, by optimising the match between co-workers, by optimising feedback so that the organisation can learn from its own experience.

As outlined above, the Japanese system tends to optimise the match between people and jobs through careful recruitment, job rotation, and training. Secondly, it tends to optimise the match between co-workers by organising them in working groups, where peer processes are more important than external control; flows of information are decentralised to optimize this form of organisation. Thirdly, peer processes, the remuneration system and other factors favouring a focus on long-term goals facilitate the development, adoption and rapid diffusion of "best available practice" through the firm. All these practices encourage flexibility and adaptiveness.

A knowledgeable reader would point out that the practices which I have attributed to the Japanese model are those of the major firms, those capable of sustaining the ideal of "lifetime employment". Different estimates would suggest that the model might cover from 30% to 70% of the Japanese workforce, almost exclusively males. However, the point is that the practices I have described do in fact serve as the ideal which informs the decisions of those who invest in human capital: students, parents, governments and employers. In an earlier paper (Dicks 1986), I suggested that this provides a fourth way of developing organisational capital: when most of the firms competing for human resources optimise in the ways listed above, then organisational capital is created on a societal or national scale.

Their overall goal is to minimise risk by sharing it over all employees (Nagatani 1991). Information critical to the enterprise's success is readily developed, quickly diffused and turned into comparative advantage. In this sense, Japanese organisations not only facilitate the learning of individual workers, but can be said to learn collectively from past experience.

Though the details vary from firm to firm, and the pattern becomes fainter in smaller firms, the Japanese approach to building organisations that learn is rational and systemic:

all the parts - formal education, recruitment, deployment, remuneration and information flows - fit together and are even mutually supportive. Given the interdependence of these parts, the system cannot be transferred easily to different organisational contexts, such as we find in the Anglo-Saxon parts of the world.

THE ANGLO-SAXON EMPLOYMENT MODEL

In contrast, "Fordist" methods of organising work seem to be increasingly counter-productive. I lump them together as the Anglo-Saxon model, for they have arisen in and dominated English-speaking cultures, at least those on the Atlantic rim. The model is based on free-market concepts such as McMillan's "Type A" (McMillan 1979). That is to say, individuals are expected to develop their skills and sell them to the highest bidder. Emphasis falls on quick profit (minimum wage for serving fast food) rather than long term planning (finishing secondary school). Skills are seen to be the property of individuals, rather than the attributes of a working group. Similarly, organisations tend to be viewed from a structural rather than a dynamic perspective. Their overall goal is profit-maximisation, and so they tend to cost-reduction by minimising the quantity and quality of labour, thus pushing control of information and profit-taking ever upward in the hierarchy. The free-market model is generally antithetical to the human capital model discussed above.

The free-market model probably suffices when production makes minimal demands for skills (eg the factory system), when labour is plentiful, when other resource costs are low, when there is little competition for markets. It served North America well during most of this century, particularly after the Second World War. However, there is every indication that it is outmoded: we have high unemployment and skill shortages at the same time; state of the art has moved elsewhere; education and training are expensive but undervalued. Further, the basic flaws in the free-market model are being exposed: skill prices do not reflect uniformly the cost of their production, and do not move down as fast they move up. Even more fundamentally, we are learning that individual expertise is not necessarily the best unit for constructing a competitive organisation.

DESIGNING A LEARNING ORGANISATION IN THE ANGLO-SAXON CONTEXT

Obviously, organisations in North America or the U.K. cannot create a new educational infrastructure, nor change all the rules governing recruitment, deployment and remuneration in an environment shared with competitors, labour unions and governments. Consequently, their approach to creating organisations that learn must be very different from the highly orchestrated one which has dominated Japan since 1945. For the most part, they must work within the boundaries imposed by our current system of developing and deploying human resources. Several different trends are detectable.

One is to literally transplant Japanese-type operations. Most of the transplants seem to have successfully transferred many Japanese practices eg. the prize-winning Toyota plant in Cambridge (Romain 1991). But these cases have several features which suggest that their success may not be easily generalised: they are largely restricted to assembly operations, in the auto industry; these operations tend to be managed from Japan, by Japanese, as branches of large corporations; they are put together by very careful selection of workers, on the basis of education, attitude and union-affiliation. They have succeeded because they have minimised the impact of our established practices, effectively side-stepping the mainstream of our organisational culture. However, they

may have a broader impact by increasing competition, and demonstrating that alternative methods of organising work are not only possible, but sensible.

Another trend has been to change the nature of the organisation indirectly, by examining all jobs, redefining their informational requirements, and then providing more or less traditional training, albeit on a massive scale. During the 1980's, Motorola changed from an organisation that "...hired people to perform set tasks and didn't ask them to do a lot of thinking" to one which emphasises basic skills, problem solving in teams, and a focus on quality (Wiggenhorn 1990). This was accomplished by getting everyone involved in training programs, from elementary to university levels, working with educators to overcome shortcomings in the school environment (Wiggenhorn 1990). In short, Motorola became a learning organisation by breaking the monopoly of managers on job-related information and the authority to act on it. This approach was indirect in the sense that it created a corporate culture conducive to learning on the part of individual workers. Success is therefore measured in terms of their performance. Better performance of the firm as a whole is of course desired, but might be said to be an emergent outcome.

On the other hand, a more direct approach is to change the organisation by renovating specific structures and procedures. In this case, success is measured by the collective learning of whole groups of people. One example of the direct approach is an outgrowth of the vast literature on "learning" or "experience curves" in production management, where it has long been known that manufacturing units improve the speed and quality of their work over time. Only recently, however, has anyone attempted to explore the factors determining whether and how learning actually occurs in these circumstances (Adler 1990).

Adler conducted a case-study of the evolution of the design and manufacture of a high-tech product in a multi-national firm - in effect, an application of "concurrent engineering". He examined how changes in the flows of critical information among the firm's functional units affected the quality of processes and product. Broadly speaking, the firm had to replace some of its formal rules, which defined its structure in hierarchical terms, with more informal guidelines prescribing a more timely flow of information. This was accomplished by changing patterns of communication: by creating new sub-units for liaison, by creating "flying squads" to carry vital information to branch plants, and by job-rotation on a large scale.

In Adler's terms, these changes were based upon a clearer perception of the degree to which these units performed differentiated functions, and the degree to which they were interdependent. For example, the firm created "centres of competence" to recognise and reinforce creativity at branch plants. These centres had a lot of autonomy, with rich internal communications, but little contact with other branches. On the other hand, the firm recognised the interdependence of the design and manufacture phases of production by rotating engineers between these two functions.

Adler's work is significant in two ways. First, it provides some empirical evidence of "shared learning", of deliberately created organisational capital. Secondly, it opens a new realm of research on organisational design, adding a higher level of analysis to the study of how training and other interventions improve an organisation's performance.

IMPLICATIONS FOR QUALITY IN THE ORGANISATION

In a broad sense, the key features in the cases described by Wiggenhorn and Adler replicate those in the Japanese approach: appropriate skills, deployed across traditional job boundaries, linked by optimal communication. We might call this "just-in-time skills delivery".

Can these approaches be adopted for large-scale changes in the way we organise work? In the Motorola case, it took ten years and an annual investment of the order of $50 million to change corporate culture, work with schools to improve labour input, and develop a systemic program of job-related training. These issues concern some newsworthy companies, but one wonders whether the majority will respond. In Canada for example, private sector investment in training is extremely low by international standards, and the results are generally seen as inadequate (Quarterly Labour Market and Productivity Review 1990).

In Adler's case, the changes in corporate structure are piecemeal, not necessarily rooted in cultural change, and so risk an abrupt end. As Motorola has learned, significant and sustainable change requires pervasive changes in attitude and behaviour. This must start at the top of the organisation and cascade down, so that managers understand and support change. In one major Canadian company which invests heavily in human resource development, upper managers initiated a program of decentralising training to teams, but suddenly changed direction when they felt control slipping away. Such are the risks which must be taken if our work culture is to change.

My experience with joint-ventures where Japanese and Anglo-Saxon work cultures come into contact indicates that the most difficult changes involve re-examining the way in which we organise the flow of information and responsibility. To generalise, sharing knowledge and responsibility is first-nature in organisations built upon group processes, team-work, job-rotation. In fact, as indicated earlier, for the Japanese the point in organising teams is to minimise the risks of labour shortage and inflexibility. On the other hand, organisations founded upon the principle of expertise, that knowledge is a private, compensatable property of the individual, tend to create what have been called "chimneys", knowledge hierarchies wherein each level is privy to only that amount of knowledge required for a task prescribed by the chimney. The other side of this is that responsibility for the quality of performance is similarly limited: in short, everyone covers their own tail.

These characteristics of the way we organize work thus mitigate against the very factors upon which quality of performance can be seen to depend: common experience, decentralised skill development, timely sharing of knowledge. If we are to begin to move towards the greater sharing of knowledge that the current interest in team-building implies, then significant changes in the way we organise work will be required. One is to push the knowledge and responsibility required to meet corporate goals down to the shop-floor. Another is to make sharing information and informal training everyone's responsibility, not just that of the official training department. Japanese successes with a systemic approach suggest that these changes must lead to many others.

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2 Quality assurance in a European context

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INTRODUCTION

> "In the European Course Credit Transfer System (ECTS), a problem that is only latent in Erasmus becomes prominent, viz, that of calling all institutions of higher education universities, and allowing them to be in the same transfer system. The European Council Decision of 15 June 1987 stipulates that the term university shall be used to cover all types of post-secondary education and training establishments which offer, where appropriate within the framework of advanced training, qualifications or diplomas of that level, whatever such establishments may be called in the Member States. Admittedly, there are non-universitary institutions of higher education in each EEC Member State that deserve a quality label as solid as that of the universities in the strict sense of the word. But as the Leuven Department of Mechanical Engineering has found out, this equal footing can have its dangers, and may lead to legitimate reactions of guarding the indigenous quality. And this time, there is in the word quality an implication of better or worse, higher or lower because, within ECTS, the university does not have a choice as to which partners to accept or reject." Latre and Del Martino (1991) p6.

> "This paper has identified some of the specific items that are held to be indicators - they are often little more than surrogates - of quality. Though they are all deemed to assess quality in different national circumstances, they themselves vary considerably. There is no agreement on the purpose of quality assurance, save only as a resource allocation device or perhaps as a resource withdrawal device. Consequently, it is those features of an institution's performance which lend themselves to cross-institutional comparison which are tending to emerge. Often these are of a rudimentary nature, in comparison with the complexities of the inner life of institutions." CNAA (1991)

MEASURING QUALITY - THE NUMBERS BIT

This ought to be the easy part. Student results in one educational system need to be translated into the parlance of other educational systems. In pass/fail terms this may be fairly straightforward. But as soon as any form of classification or grading becomes involved - as in Higher Education it surely must - then considerable difficulties arise.

The BA (Hons) European Finance and Accounting Degree at Leeds Business School is at present a 3-legged Erasmus supported ICP, involving Leeds, Hochschule Bremen, and ESC Normandie. Students spend 3 Semesters at "home", 2 semesters at one of the other institutions in full-time assessed study, and the final semester at home. Successful students receive 2 separate qualifications, 1 from each relevant country. The formal mechanism for this is that assessments are taken in Semesters 4 and 5 in the "foreign" language and cultural context, and also in Semester 6 in the "home" language and cultural context. This produces a single set of marks, which are then fed separately into 2 legally different sets of examination regulations. These regulations can have their own differences. For example, a student who has 2 attempts at an assessment, receiving marks of 30 and 32, would be regarded as failing the module for UK purposes. For German purposes the student would have the right of a further attempt. Conversely a student receiving marks of 30 and 38 could well be regarded as achieving a 40 mark for UK

purposes and therefore a pass, but such subjective adjustment could not happen at a German examination board.

More fundamentally, however, where do the numbers themselves come from? Table 2.1 gives the agreed conversion scales used for students enrolling in 1989 and 1990 on the same course in the same circumstances. The relationships between the two years are significantly non-linear. We must remember that these are actual scales producing numbers which determine the degree classifications of actual individuals. It is clear that the decision as to which scale to use could influence degree classification or even pass/fail.

1989			1990		
French Mark	CNAA Mark %	German Note	French Mark	British Mark %	German Note
20	100	1.0	20	85-100	1.0
19	90-99	1.0	19	80-84	1.0
18	80-89	1.0	18	75-79	1.3
17	75-79	1.0	17	70-74	1.7
16	70-74	1.3	16	67-69	2.0
15	67-69	1.7	15	63-66	2.3
14	64-66	2.0	14	60-62	2.7
13	60-63	2.3	13	55-59	3.0
12	57-59	2.7	12	50-54	3.3
11	54-56	3.0	11	45-49	3.7
10	50-53	3.3	10	40-44	4.0
9	46-49	3.7	9	38-39	4.3
8	40-45	4.0	8	36-37	4.3
7	38-39	4.3	7	34-35	5.0
6	35-37	5.0	6	32-33	5.0
5	30-34	5.0	5	30-32	5.0
4	20-29	5.0	4	25-29	5.0
3	15-19	5.0	3	20-24	5.0
2	10-14	5.0	2	10-19	5.0
1	0-9	5.0	1	0-9	5.0

Table 2.1 *Examination mark conversion scales*

How are these scales prepared? The intention is that, taking one cohort of students with another, there should be the same number of firsts, upper seconds, etc from each country's batch of students. Or, to put it the other way round, that a student should have the same chance of a first whichever his home and foreign institutions.

Given the intention, the detail follows on a rough and ready statistical basis, supported by discussion and subjective judgement between colleagues from the institutions. The crucial difference between the two scales, of course, is the minimum pass mark for each module in France and the UK. There was a widespread view amongst staff that the 1989 scale was producing wrong results. Notice incidentally that the long tails in the German Note present obvious difficulty. A 5.0 has to be translated into a specific CNAA number for condonement and averaging considerations. Our German colleagues have no such problems, as condonement is not possible under their exam regulations.

Leeds Business School is about to extend this programme to a fourth partner, at Pescara

in Italy. The first stage in the process of producing a fourth column for Italy in the scales is to establish typical Italian thinking in first-degree assessment and grading.

In the Italian Laurea System results are based on an overall mark out of 110. Each course is given a mark out of 30 if it has been passed (the assessments are nearly always orals). A bare pass is given 18, a failure is not given a mark. Resits are possible without limit (but not to raise a passed mark). The marks from as many as 30 courses are then averaged, with equal weighting. This average is then divided by 3 and multiplied by 11, to give a mark out of 110. The thesis is then presented and defended in public, and marked by a jury of 11, out of ten. This mark is then added to the mark out of 110, and the total is regarded as a mark out of 110. The theoretical maximum mark out of 110 is therefore 120, but a total over 110 is regarded as 110. It is this final mark out of 110 which gives the Laurea its "classification".

The task of moving from this starting point, to an extended fair and equitable Conversion Table, is one we approach with some interest!

BEHIND THE NUMBERS - WHAT ARE WE TRYING TO MEASURE?

It might appear from the discussion so far that the major problem is to create the best possible numerical conversion scale. In other words it might seem that there is a theoretical "right" version of the scales, and that the problem is that we can never more than approximate to it. This conclusion would be grossly misleading and optimistic however. A "right" version of scales only exists even conceptually or in theory if there is a commonality of view as to what it is that we are trying to measure. There is absolutely no such thing.

Education, educational process and educational measurement are all subjective processes. They are defined and monitored by human agents. Tutors are entitled to be as individualistic as learners are. But that is not the point here.

In any particular community or any particular culture the majority of members will tend to concentrate round the norm as regards any particular defined dimension. In the educational sphere we might hypothesise, for example, that the majority of an educational community will tend towards a broad agreement on the issue of the importance of theory and practice, and of the desirable balance between the two elements. The key issue, however, is what is meant by the phrase "an educational community". It is suggested here that, bearing in mind we are talking in a pan-European context, "an educational community" will often need to be defined fairly narrowly for the above hypothesis to be valid. This narrowness may well apply in both geographical and discipline focus terms. "German higher education" is too broad. "Business higher education" is too broad. "German business higher education" may be narrowly enough defined to justify generalisations.

We are led to the hypotheses that:

1 different discipline focus areas may, in general, have significantly different higher education aims and philosophies, and therefore practices;
2 different geographical/cultural regions, within a single discipline focus, may have different higher education aims and philosophies, and therefore practices.

In the context of student mobility, the latter issue is probably the more significant one in its effects. By way of illustration we briefly discuss here some perceptions of business education, and some particular experience with dissertations.

The major French Business Schools are some of the most high profile higher education institutions in Europe. They are characterised above all else by close integration with the real business world and by a strong emphasis on practical application. This is encapsulated in the commitment to the case study as being the major learning mechanism. Work-placements are crucial. All this has a negative as well as a positive side. The emphasis can sometimes be on practice, rather than on theory and its application to practice. There is a strong interest in group work, personal skills, and synthesis of practices. There is less interest in reading, in theory, and in personal intellectual development. The French Business Schools and their products (they should not be confused with Economics-related departments at French Universities), have enormous importance in French business activity.

Germany has no such tradition, there is no longstanding German equivalent. But it is difficult to argue on empirical grounds that the German economy and business community have been disadvantaged thereby. The approach to business education in Germany is much more "academic". In our experience this approach is characterised by emphasis on libraries, on reading, on lecture or lecture and exercise, rather than on seminar or case study. Work placements may not be involved.

UK practice is probably somewhere in the middle, with named "Business Studies" degrees attempting (usually very broadly) to adopt the work-related French practices, whilst more specialist degrees may tend to a more library-based approach.

These generalised differences are well illustrated and demonstrated in the approach to dissertations we have discovered on the Leeds Business School European Finance and Accounting Degree. In summary, we can suggest the following:

- Germany - library based, long, detailed, ("Fussnoten Fetischismus"), personal opinion neither encouraged nor expected;
- France - real-life, empirical base, little interest in theory;
- UK - library or library-empirical, personal opinions and appraisal regarded as essential;
- Italy - extremely rigorous, theoretical, assessed on a public presentation (usually called a "defence" which is perhaps indicative).

We might suggest there is very little commonality here as regards educational criteria. So how can we monitor quality across the whole multi-country programme?

The numbers conversion problem discussed in the previous section can in theory be eliminated by agreeing a single common marking scale across all partner institutions. But this does not get us very far unless we can also create a single coherent pan-programme statement of the desirable characteristics (and their relative importance) of a "good" dissertation. This means, in other words, doing away with national (ie geographical or cultural) differences.

The other possibility is to say that these differences are expressed in different dimensions and are therefore not ultimately comparable. No one dimension can be translated into the measurement units of the other. (This room has the better shape, that room has the better lighting. Which is the better room?) We simply accept - or reject - that these very different skills, objectives and attainments are of similar quality. (Both are good rooms.) This can be done by measurement of inputs, the use of surrogates, or by overt subjectivity. This last may not be at all a bad idea. In other words we are recognising the inevitability (and perhaps the desirability) of "national" (geographical and cultural) differences.

There can be no fudging of the issue, no half-hearted compromise. We cannot, with any semblance of objectivity, cross-monitor quality by an output measure unless we adopt a single European Education Currency Unit.

CURRICULUM DESIGN

The characteristics of the system for curriculum design in England may be summarised as follows.

a) There is no overt state regulation, though the government exercises influence, or attempts to, through its funding and student maintenance policies. Even here it is acting through intermediaries - PCFC, UFC, Local Authorities.
b) Responsibility for approval of the curriculum rests with individual universities and for a little longer with CNAA, BTEC. These bodies provide only a loose regulatory framework - loosest in the universities and tightest with BTEC.
c) Curriculum design rests with a team of academic staff who normally act within the assumptions and traditions of their subject or professional area.
d) Approval involves an element of peer, and normally, external peer, review.

By contrast continental Europe is characterised by state regulation of the curriculum and a lack of external peer review.

In Finland the basic degree (equivalent to a UK Masters) is regulated by Council of State decrees which lay down the objectives, structures and conditions for awards in 19 fields of interdisciplinary and vocationally relevant study. It is a credit based system with the basic units of study classified into general, subject and advanced.

However, within this framework the syllabi and assessment of units are a matter for professors, with the approval of a representative Departmental Council. It is very unusual for this Council to question, let alone reject, a Professor's proposals.

In Italy the basic degree of Laurea lasts four years. The Ministry of Education approves the examinations which constitute a particular Laurea. When a new Laurea is proposed it receives the approval of a university and then has to be enacted by the Ministry.

However, this central control is more apparent than real. The Ministry names the examinations but individual professors have great autonomy in determining the content of the curriculum and assessment. In Engineering, however, there is a national system in which the first two years are largely common to all universities as a result of pressure from industry and the professions.

One might conclude from this brief survey that the difference between the devolved approval systems of the UK and the state regulations of continental Europe is more apparent than real. Paradoxically, the real contrast is between the practical professorial autonomy in Finland and Italy and the practice of peer review in England.

COURSE MONITORING

In England this is normally conducted through some form of regular monitoring meeting by staff (and sometimes students) and through the external examiner/moderator system.

Germany and Italy do not have any formal, regular monitoring. Germany, however, conducts a formalistic system of assessment with the moderation of examination papers, double marking and final determination by an elected Examinations Committee. Each subject is required to produce an annual report on student performance to the elected Departmental Council which includes student representation. However, there is no external moderation.

In Italy much assessment is still oral and conducted in theory by three professors, one of whom is a specialist. In the early years of the Laurea this seems to be increasingly compromised because of the pressure of student numbers, leaving decisions to the

individual professor's judgement. There is no monitoring system. Informal student pressure is exercised through their choice of examinations to study - by avoiding the poorly taught or severely examined - or, at the final resort, through protests and strikes. Again there is no external moderation element.

Once again the obvious contrast is between the autonomy of German and Italian professors and external peer moderation in England.

CONCLUDING ISSUES

These brief excursions into only some of the realities that lie behind the generalities of quality assurance systems illustrate the practical issues that have to be addressed in the context of pan-European higher education. Behind these practical issues lies a more fundamental difference between the English use of external peer review and the continental reliance on the professional autonomy and integrity of the professor. Perhaps even more fundamentally England has a determination to assure an equivalence between institutions at variance with continental practice, which accepts the existence of formal and informal hierarchies.

At the operational level of delivering joint programmes and exchanging students the essential issue is one of standardisation or equivalence. Arguably the only practical option is equivalence and, even more arguably, acceptance of the practices of each other's institutions.

When we look to the future we should also observe that continental European higher education provides for a mass student market. Can England's expensive quality assurance procedures survive the arrival of mass higher education? And should it? In the last analysis quality does depend upon the professional competence and integrity of individual tutors and professors. Arguably no system assures real quality. And perhaps market perceptions could, and should, be the final judge?

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3 "What's in it for me?" Organisational culture, rewards and quality

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INTRODUCTION

Quality systems generate a quality culture and this is what is at the heart of successful organisations. Here we have examined some of the literature on successful quality organisations. We have followed this path because both manufacturing and service industries spend a great deal of time addressing the topic of cultural change. We believe that if further and higher education are going to make serious moves towards effective quality assurance, whether through a QMS (Quality Management Systems) or a TQM (Total Quality Management) approach, they need to be aware how much the culture may have to change. This may be highly uncomfortable for senior management. For instance, a 1989 survey of 3,000 company quality schemes in the UK identified one major problem:

> "Almost all companies have found it difficult to achieve cultural change and to get management, especially lower and middle management, to change their ways of working" (Develin 1989).

As we move towards quality in HE, everyone will have to make changes.

WHAT ARE ORGANISATIONAL CULTURES AND CLIMATES?

After identifying no less than 164 different definitions of culture, Kroeber and Kluckhohn (1952) conclude that:

> "Culture consists of patterns ... of ... behaviour acquired and transmitted via symbols, constituting the distinctive achievement of human groups, including their embodiments in artifacts; the essential core culture consists of traditional (ie historically derived and selected) ideas and especially attached values; culture systems may, on the one hand, be considered as products of action, on the other as conditioning elements of future action."

In the 1980s and 90s we have rather snappier definitions. "Culture is the set of values, behaviours and norms which make an organisation tick" (Atkinson 1990). Snappier still, Marvin Bowers' immortal quote that organisational culture is: "the way we do things around here" (Deal and Kennedy 1982).

An organisation's culture takes years to mould, develop and grow, and years to change. An organisational climate, on the other hand, is described by Botterill (1990) as: "the collective current impressions, expectations and feelings of the local work units".

The climate of a unit or department is the "now". It can change instantly. A sharply worded memo or a derogatory remark in a meeting or overheard criticism can, on occasion, radically change the climate of interaction. Climatic attitude is the day-to-day relationship the individual (and sometimes the group) has with others in the organisation. Unlike climatic attitude, culture is more enduring and stable. Some key characteristics

of that culture are that it is: commonly held rather than shared, real only in its use, ie consequences, historically based, learnt, heterogeneous.

What indications are there of corporate culture? These are many and varied and in HE they might include: specific management styles, telephone style within the organisation, willingness to give personal tutorials, how staff spend their lunch breaks, feedback to students, teaching styles, tidiness in offices, graffiti in the loos, quantity of visual stimulation on the walls.

All these are possible indications of organisational culture within an educational environment. They can be positive indications of an organisation with a quality culture.

WHAT IS DIFFERENT ABOUT QUALITY ORGANISATIONAL CULTURES?

From our own observations and from our researches we are quite certain that there are some major differences between the culture of organisations which are held to be successful and which present a quality image and those of other organisations. What we are now going to describe is surely as true for further and higher education as for any other service organisation.

Firstly, quality organisations tend to have quite specific quality values, whatever sector of the market they are working in.

In many organisations values may not be explicit. Perhaps further and higher education are different in this respect. Staff will frequently be aware of their own personal value systems and they will sometimes contrast those with the mission statements of their organisation, or with management actions which seem to belie those mission statements.

So what kind of quality values underpin quality behaviours? Linkow (1989) suggests seven core values: 1. customer focus, 2. employee focus, 3. teamwork, 4. safety: for employees, communities and users-of products and services, 5. candour, 6. total involvement, 7. process focus: emphasising the continuous improvement of all processes.

This is by no means a complete list. We might want to add to it such values as: intimacy, integrity, unity, consensus, excellence.

We believe that it is absolutely essential that values in higher education are made explicit and that there is both the unity of purpose and a unity of belief between managers, teachers, administrators and students.

RITES AND RITUALS, MYTHS AND LEGENDS

One increasingly common way of examining the culture of an organisation is to look at its manifestations through such areas as heroes, rites and rituals (Linkow 1989). Heroes are an important influence on behaviour in an organisation. Heroes are individuals who, in deed and presence, personify and transmit the culture's values. They provide tangible cues and act as role models for others to follow. From our own varied experience we have come across a number of heroes. Comments from colleagues on their heroes include:

"She's so laid back with the HMI"

"The guy was a walking library"

"Everything he says carries so much force and conviction"

"She stepped in at the last moment and gave a key note speech better than anyone else could have done!"

"He showed a slide of a field and had students enthralled with tales of Eric Blood Axe"

Heroes are influential within the organisation. Most are situational heroes. They don't charge out of the trenches but make the right movement at the right time. They are the stuff that organisational legends and exaggerations are made of. A commonly acknowledged fact of higher education is the preponderance of anti-heroes over heroes. Anti-heroes are often the focus of gossip. They are the deviants of the organisation. Their deeds signify boundaries of what is and what is not currently acceptable behaviour (Atkinson 1990). When office doors are shut, stories of anti-heroes are often told, such as:

"She skives off all the time"
"He is never around when you want him!"
"He has got a private business on the side"
"Power has gone to his head"
"She abuses the rules"
"He sleeps with students"

Rites and rituals (Trice and Beyer 1984) are the programmed and routine interactions of organisations. In higher education we have numerous rituals including the annual "induction ritual" for new students. This cyclical ritual minimises disruption and shows newcomers the kind of behaviour expected of them.

Common rituals for members of the Department are, "the staff meeting" or "the Board of Study". A particular ritual of higher education in recent years has been the "touching base" meetings ritual. This consists of staff, often from diverse Departments, being called to meet and "look at" some project or other. Vague indication is given that some document or other needs to be produced and this cohort will produce it. For instance, the "Faculty Planning Group" and the "Research Strategy Group" are common groups throughout higher education. They meet and, without much experience or direction, manage to produce a document. Once produced, members are seen to have "served their time on this one".

Rituals in higher education are widely experienced as lacking direction or clear integration with the values of the organisation.

WHAT'S YOUR OWN ORGANISATIONAL CULTURE REALLY LIKE?

Values are the bedrock of any culture. They provide a sense of common direction for all members of the organisation and guide day-to-day behaviour. The following exercise will allow you to look at the pattern of values in your organisation. It will assist you in understanding where your organisation has got to on the road to quality values. Go about the exercise by using the following instructions with figure 3.1

	INSTRUCTIONS	COMMENTS
1.	Look at the list of values in the box "zones of relevance" in figure 3.1	Some represent values of quality practice
2.	Tick up to 7 values that you believe represent the values held by each role holder	Play yourself and take the role of the other Understanding other people's role is crucial to quality

3. Add up the score for each role placing the total at the end of each row

High scores indicate a base from which quality values can be developed
Low scores indicate need for change in values

From our experience of working with several institutions of higher education we have noticed an inverted relationship between the values and expectations of management and those of staff. Where staff widely practise quality values and expect the kinds of rewards associated with such values (see Vroom 1964 on "expectancy theory") management has yet to embrace these values and recognise the expectations they create. We conclude that the kinds of values held by some management are a major barrier to a quality organisation. If management does not address these issues we predict that polarisation will increase, leading to entrenched positions between management and staff. The result will be internal conflict - the antithesis of quality.

Zones of Relevance
(Degree of attachment to values)

Blackend Institute of Higher Education

Roles	12	11	10	9	8	7	6	5	4	3	2	1	Score
YOU													
THE DEAN													
THE DIRECTOR													

student focus
lecture quality
communication
teamwork
candour
environment
resourcing
student numbers
income
expenditure
performance
maintaining fear

Figure 3.1 *Matrix of values*

WHAT'S IN IT FOR ME?

As further and higher education institutions move towards a quality culture, regardless of the system that they use to introduce that culture, they will need to reward and support their staff. If staff are expected to work towards targets, levels of performance and diversify their activities, they will expect rewards. Management will need to recognise

this expectation and address it with equity and openness. Contrary to popular belief, management will not need to attend to motivating staff, but to harnessing the values staff hold as the foundation for organisational quality.

In commerce, the drive for customer satisfaction is often linked with remuneration. As yet, further and higher education in this country is only just beginning to grapple with the introduction of performance related pay for middle management and other staff. If staff are to work hard towards promoting quality they will surely need both rewards and recognition. How are these to be achieved? Rewards and recognition might come through: training and staff development, an improved working environment, improved mutual respect, some form of financial remuneration.

CONCLUSION

We've suggested that if further and higher education are to deliver quality systems then they will need to examine their cultures. Quality in education is concerned with having an appropriate range of services, and getting the service right on each and every occasion. Clearly, quality costs. But in making decisions about quality, consider the costs of ignoring quality: poor communication, misinformation, fear and insecurity, lack of direction, crisis management, lack of information flow, too many conflicting priorities, no identifiable mission, "make it cheap" attitude, time wasting in all forms, time table changes at short notice, crisis cycles.

Avoiding the waste and demoralisation of traditionalism necessitates management change. Senior management needs to get its internal customer relationships right if it is to provide excellent quality relationships with its external customers.

An appropriate and supportive culture is at the very heart of a quality organisation. The entire workforce must have some kind of common identity.

> "All employees must believe in the company itself, its culture and their own importance to the overall success of the product or service. This belief must emanate from within the leadership where the key to corporate culture is PUTTING YOUR PEOPLE FIRST. Your employees are your greatest and only appreciable asset, and your treatment of them will be reflected in the quality of both product and service" (Botterill 1990).

Ultimately, it is that sense of corporate belief and shared values which will distinguish quality organisations in education. That may be what is in it for you.

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4 Quality and the academic administrator

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INTRODUCTION

It is self-evident that the quality of a product or service is underpinned by the efficiency and effectiveness of all the operations that contribute towards the product or provide the service. Thus quality initiatives which seek to improve efficiency and effectiveness, particularly TQM, have an impact on all groups of staff but each group may view some of the issues differently. Whilst it is recognised that all staff are involved to a greater or lesser extent in administrative functions, the academic administrator can be seen as the facilitator between the teaching staff as the deliverers of the primary service (courses) and management as the providers of policy and strategy. Here I shall draw on research into the efficiency and effectiveness of Course Monitoring and Review process in the School of the Environment, Leeds Metropolitan University.

There are many questions raised by consideration of TQM in this context. I shall focus on three only:

- how to establish the internal customer/supplier relationships;
- the use of performance indicators;
- the application of TQM principles in a non-TQ environment

INTERNAL CUSTOMER AND SUPPLIER RELATIONSHIPS

The principle raison d'être of a TQM organisation is to ensure that its product/service is fit for its purpose and satisfies customer requirements in order that they will repeat their custom and encourage others to be customers thus ensuring the continuing enterprise of the organisation, hopefully at a substantial profit. Within the education context we know that our principal customers - students - require a good quality education that will fit them for their chosen career. It is the Institution's responsibility therefore, to ensure that courses are fit for that purpose both through the curriculum and delivery. However, Atkinson (1990) argues that the focus on the external customer must not be at the expense of ignoring the internal customers and finding out their requirements.

As part of the research into Course Monitoring and Review, interviews were conducted with staff in various functional roles including managers, teachers and administrative/clerical staff. A question about the external customer and internal customer formed part of the semi-structured interview. Whilst everyone understood very clearly who was the external customer(s) - primarily the students (but also employers, the professions, Government) - the concept of an internal customer was not so clearly perceived. However, as Leeds Metropolitan University is not as yet a practising TQM culture this is perhaps not so surprising.

Who is our Internal Customer/Supplier?

John Oakland (1989) states that: "The next person who checks [uses] your work will be your customer" p 243.

Like many of the principles of TQM this is very simple to state. It is suggested that the reality is much more complex. The many inputs and outputs to the process of Course Monitoring and Review typically include: employers, validating bodies, professional groups, HMI, external examiners, students, staff, committees, boards, student services, academic standards. These may be said to represent the myriad internal customer and supplier relationships that exist for this process alone. If we superimposed on this the numerous other activities that we are involved with we would see that, whilst some customers and suppliers would be removed, others would be added. Indeed even this list has failed to include those support staff who provide the domestic arrangements for a review.

Professor Oakland (1989) uses his Quality Chains diagram to illustrate the links through an organisation from external supplier to external customer (see figure 4.1).

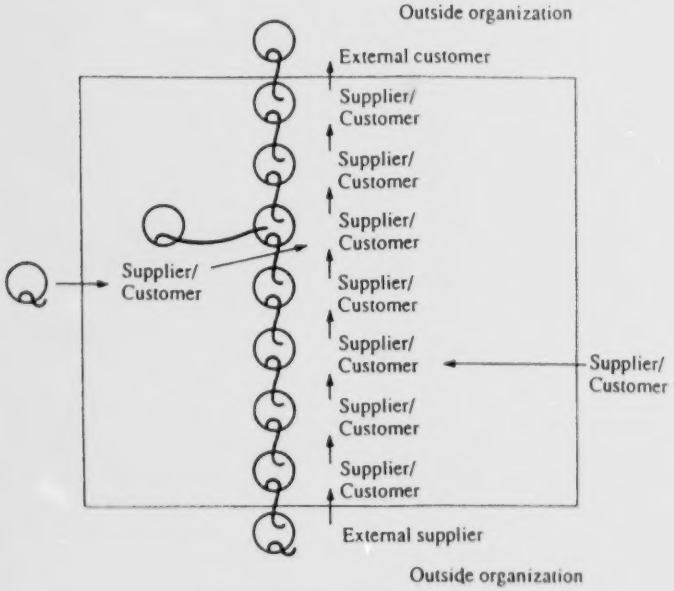

Figure 4.1 *The quality chains*

It could be argued, however, that the customer chains obtaining within HE institutions do not and cannot take such a simple linear form. For instance, a senior administrator in a Faculty works with managers, other administrators and teaching staff. Sometimes our relationship to one or other of these groups is as a supplier and sometimes as a customer. Often they can both be in the same process! An example from my own experience would be: to produce the School Examination Timetable the teaching staff have to supply me with their requirements. I piece the jigsaw together which necessitates liaison with a central Polytechnic administrative office - I supply information to them, they make accommodation bookings for me (customer). I produce a timetable for my customers, the teaching staff (previously suppliers), and ultimately for the external customer the students.

What is suggested by this example therefore is that the notion of internal customer and supplier fails to take into account that these relationships flow in both directions, at least certainly for the administrator who is caught in the middle! This suggestion is not intended to be an argument against the value of establishing internal customers and suppliers and finding out their requirements but to suggest that as we do not work in a production line outfit, a different interpretation is perhaps required. For instance, quality chains may be more appropriately applied on an activity basis as opposed to a role basis. Figure 4.2 shows how this interpretation has been applied to the activity of examination timetabling.

EXAM TIMETABLING

	Me as Customer		Me as Supplier	
S U P P L I E R S	Teachers	Quality of Service dependent upon accuracy and timeliness of data.	Awards & Exams	C U S T O M E R S
	Awards & Exams		Draft/Secretary	
	TT wordprocessed		Teaching Staff	
			Students	

Figure 4.2 *Internal customers/suppliers of exam timetabling process*

This approach helps unravel the complex links of a non-linear chain. Once unravelled we can more easily answer the key questions:

- Who are my customers for this activity?
- What are their requirements?
- Who are my suppliers for this activity?
- What are my requirements?

PERFORMANCE INDICATORS

The extent to which we do or do not meet requirements is the performance indicator (PI) of the quality of our service in our particular role or function.

Once the internal customer/supplier link is established the next stage is to establish the precise requirements in that relationship. We are probably all too familiar with how the requirements of a particular role or task are so often fogged by expectations on the one hand and assumptions on the other. We have probably all heard and used the expression "But I thought *you* were supposed to be doing that." When roles and requirements remain undefined it is inevitable that this will happen.

TQM gurus use the expression "right first time" (RFT). If this is the ultimate performance indicator why is it so difficult to achieve, bearing in mind that Performance

Indicators (PIs) should be achievable? Is it an appropriate PI given the nature of our tasks and the environments in which we work? The days of tradition and stability are over, replaced by a high-speed culture that is constantly changing, leading to the phenomenon of "grey stress" (Bedell 1992) as we come under pressure to adapt and perform. Does this culture permit the time and space to perform RFT?

Not everyone is convinced that TQM is the best thing since sliced bread. RFT would make all our lives easier - no more redrafting of notices of meetings because you got the date wrong, because you were interrupted by the telephone and someone came to your desk wanting just a quick word; no more redoing the student numbers spread sheet for the nth time because some enrolment forms have been discovered on a staff member's desk three months after enrolment; no more redrafting the Course Document because it has been decided to change the sequence of sections. Yet these events are the realities of our daily lives. Indeed it is as much a part of our service to internal customers, as to external customers, to respond to requests and change. Is RFT not then a rather sanctimonious view of an ivory-tower theorist? Add to this the patronising comments from senior management such as "we never have the time to get it right first time but all have the time to get it right second, third time" and RFT as a PI can really stick in your throat.

What is the nature of this PI and others within our real environment? Are they not in fact a stick with which to threaten rather than motivating objectives? Certainly at the macro level they are used as such by the funding bodies. If objectives and targets are not met then funding is reduced. In this regard PIs take on the quota function of the production line. The answer to these criticisms of course is that it all depends on the culture in which PIs and all the other principles of TQM are applied - the subject of my final section.

Ignoring the arguments against PIs it is contested that they are still a very problematical area for the academic administrator. For PIs to be non-subjective they have to be measurable, ie. subject to SPC (statistical process control). What sort of PIs could be applied to the administrator?

A few suggestions might be: turnaround time - how long for a specific task?; 24-hour response time for standard information; accuracy; sensitivity to different perspectives; value as an information source; use of secretaries.

For PIs to be realistic and achievable they must be looked at in terms of the internal customer/supplier relationships and the number of those that exist. If you have a reputation for being good then you attract more customers but how many customers can be realistically and effectively dealt with before the service is reduced and your reputation tails off - as with a business over-extending itself? It may actually be necessary to reduce customer volume in order to improve quality. (Heresy!!)

There is another difficulty consequent upon applying PIs in a non-TQ environment. Whilst they may be legitimate to measure the performance of an organisation, in our present culture they become personalised - they become focused on an individual rather than on the structures/teams in place to support that individual in their activity. Taking account of the above limitations, the reality of our present (non-TQ) lives could counter each of the suggested PIs as follows:

- turnaround time
  ... four weeks for an Exam Timetable - what if the Dean wants a breakdown of student numbers by domicile in the meantime?
- 24-hour response time for standard information
  ... what is standard? If its not in "the book", is it not standard? What happens when the person who can give you the information is away till next Tuesday?

- accuracy
  ... no argument on this provided we work in an environment that is conducive to concentration and checking
- sensitivity to different perspectives
  ... how do you measure sensitive?
- value as an information source
  ... how do you measure value?
- use of secretaries - this is a real one!
  ... how many times do we send a piece of work back because we have redrafted it as opposed to there being typographical mistakes to be corrected?

Ideally - in a TQM environment - none of these provisos should apply. In the meantime the reality is that they do.

TQM PRINCIPLES IN A NON-TQ ENVIRONMENT

Readers will probably know that TQM is a philosophy which sets out to achieve optimum efficiency and effectiveness by reducing waste and error through the application of certain principles and operating methods to achieve quality in every aspect of an operation to satisfy external customer requirements.

So far I have focused on just two of the principles/operating methods required for a TQM culture - establishing internal customer/supplier relationships and the use of performance indicators. However desirable, it is suggested that these principles cannot be applied in isolation of an all-encompassing TQ culture. I shall now explore some of the key features that are required for this culture.

Leadership and Commitment

Quality is a strategic issue and an attitudinal position. The decision to go down that road must be led by the Senior Managers of an organisation for it is from this level that attitudes in an organisation are inculcated. It is through the example and commitment of Senior Managers to quality that the whole organisation is enabled to adopt a quality ethos.

Resources

The provision of resources for education and training is crucial - to educate people in ways of working in a quality environment and training to practise error prevention rather than error detection; in the use of problem-solving techniques and tools.

Another valuable resource is time - time to do the job RFT. Time management courses may help but consideration also needs to be given to the actual management of staff resources to support the various activities.

Communication

Open communication is a crucial feature of a TQM culture. In order for employees to feel committed to an organisation's objectives they need to know and understand what these are. Decisions are made with regard to objectives - how to implement them, why they might change, how they bear upon an employee's place and operation of work.

Employees are the implementation channel through which an objective is met. In a TQM culture, however, communication goes further to become an interactive process leading to participation.

Participation

An organisation may have very good channels of communication - newsletters, up-to-date notice boards, regular policy statements - but if people are not involved in the decision making processes a sense of belonging and commitment is not cultivated. A non-participative style of management perpetuates an "us and them" syndrome. My research showed evidence of this attitude at Leeds Metropolitan University - between teaching staff and management, teaching staff and administrators, administrators and managers. Each perceived the other group as taking decisions which affected their lives but without reference to them. "Old style" management might consider that it is the prerogative of management to make "managerial decisions". TQM does not sustain this prerogative. Instead it recognises that participation has a lot to do with an individual's sense of power and control. Powerlessness undermines confidence and motivation and does not inspire a sense of responsibility. Participation brings about a sense of involvement, identity and responsibility - for the task and the objective.

Team Building

Establishing a culture of open communication and participation can be a foundation for team building. The value of team building has often been stressed in management handbooks. In TQM, teams may come under the guise of "quality circles", "problem solving teams". Whatever their guise it is suggested that they can achieve more than their purpose at hand if they are cross-functional and/or cross-departmental. They help build on participation and involvement. They help build communication. A suggested quasi-PI was sensitivity to another's perspective. I can have great empathy with fellow administrators. I know "where they're coming from", what their problems are. This helps establish a strong cooperative spirit. Teams can help establish empathy across different roles and functions, it enables us to get to know each other better and our different perspectives. This increased awareness reinforces the principle of internal customer and supplier.

These selected basic principles of TQM are in themselves not that original in management theory. But it is the combination of them in a specific context that makes TQM different and so very difficult to achieve. It is difficult to implement because it is a very long term and continuing process, requiring wholehearted commitment and, probably, an initial outlay of resources. More significantly however, it requires a fundamental change to most organisations' corporate culture: from a closed culture that is secretive and dominated by coercion and intimidation, resulting in staff being defensive and non-critical of performance, to an open culture where fear is driven out, barriers broken, targets eliminated. Where people are self-critical and take pride in their workmanship - these are the values which provide the impetus for improvement.

CONCLUSIONS

My conclusions are simple. Quality can be a personal standard. Right first time can be a personal standard within the constraints of an individual's environment. TQM is posed as the panacea to lift those constraints so that quality can be applied across the board.

But does TQM pose more questions than it answers? A few have been suggested from the administrator's point of view, there are many more view points. TQM is different from our usual experience, it is another change.

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5 Total quality management in an education and training context

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DEFINING QUALITY

Philip Crosby, an American quality "guru", defines quality as, "Everyone in the Company from the doorman to the managing director, routinely doing things right".

This is a helpful, but in one respect a puzzling, definition of quality for Further Education and Training. It is in taking what is helpful, and in grappling with what is puzzling, that further education establishments can find a direction to move forward on a coherent and planned approach to assuring and improving quality.

I imagine that no-one in education would quarrel with the assertion that everyone within the organisation should be involved in the drive for quality. Students attend or interact with colleges in a variety of ways and have a complex range of expectations and needs which they require the college to fulfil; these may range from the achievement of defined learning outcomes, to personal development, social satisfaction, counselling and guidance and will undoubtedly include the expectation of courteous and efficient service in all of their dealings with the college. Clearly, everyone employed by the college will affect the quality of the student's experience.

Neither is there initially any difficulty with the notion of "routinely doing things right". At the first level of understanding this expresses a commitment to delivering each part of our service on a right first and every time basis. Anything less would imply an acceptance of sloppy work and inferior standards.

However the problem arises when we examine the notion of the meaning of right in education and training. Our core technology, the enabling of learning, is a complex and interactive process and a simple exhortation to get things right begs the fundamental question - What is right in education and training?

There are numerous and frequently changing interpretations of what constitutes a quality learning experience; these may be subject to political dogma, changing fashions in education technology and pressures from stake holders other than the learner. A tempting solution to this dilemma would be to limit our quality assurance to those elements of our service which would be easier to describe and quantify; it is right and laudable that such aspects of our service are included in any quality improvement process but to ignore the fundamental issue of the quality of learning would be to relegate quality to the periphery of our activities and would fail to capture the imagination of our teaching staff.

Given that learning is an interactive process and that, in the literature of Total Quality Management, quality is seen as meeting the requirements and expectations of the customer, a way forward becomes clear - we consult those most intimately involved, the learners. By a process of negotiation between the suppliers (the staff of the college) and the customers (the students) we can arrive at an explicit and realistic set of quality requirements that we can guarantee to achieve.

But unlike other service industries, the quality of our "product", the learning outcome, is not wholly within our control. We can only control our processes. The learner's contribution is vital and therefore should form part of the stated quality requirements. Thus, by negotiation we will arrive at a quality contract or a quality entitlement owned by the learner and the college. This contract will guarantee certain services, processes and behaviours so that the student and the college staff will fully understand what to

expect from each other. The aspiration would be negotiated quality requirements with each learner but at first it may only be possible to arrive at negotiated quality requirements for groups of students.

Thus the quality we assure is realistic within resources, meets our customer's reasonable expectations, is owned by the customer and the supplier and is achievable. By stating specific requirements we can measure achievement and plan to improve on any shortcomings.

Quality is performing to requirements each and every time.

PLANNING TO ACHIEVE QUALITY

Total Quality Management is concerned with people, systems and culture.

It is a truism that people are any organisation's most valuable resource but, in the context of quality improvement and assurance in education and training, it is worth repeating. Management's task within TQM is to create a situation in which the commitment, flair and experience of the staff can be released and guided to meet the agreed requirements of the customer. It is essential that senior managers themselves are trained in the philosophy and practices of TQM prior to committing to a programme of quality improvement. The genuine involvement of all in negotiating quality requirements, planning to achieve those requirements, identifying problems and offering and implementing solutions will be exciting but challenging and it's all too easy to retreat into hierarchical and authoritarian behaviour when the rhetoric becomes the reality of genuine involvement and problem identification. Management commitment must be visible, genuine and ongoing.

Management commitment is demonstrated by;

- generating the quality policy through consultation
- publicising the quality policy
- allocating money and time to the quality process
- attending quality team meetings
- talking with staff both informally and formally about quality
- modelling the quality culture
- valuing and respecting people (all of them, all of the time)
- insisting on clear quality requirements and documented procedures

At the beginning of the quality improvement process, managers will need to win their staff's commitment to, involvement with and awareness of quality by providing an opportunity for them to agree and make explicit the shared values of the organisation. Secondly, they will need to set up systems for team working and open communication. The notion that quality is achieved by the requirements of the customer is equally applicable to customer/supplier relationships within an institution as it is to the external customer and supplier. Therefore teams will be most effective if based on these internal customer/supplier relationships. The teams will be able to work together to agree quality requirements for specific services or functions, plan the work processes to ensure that these requirements are met, identify where errors or problems are occurring, devise and suggest solutions to these problems and act to eliminate the error. They will need to feel secure that this work will be regarded as positive and commendable and to know that there are formal and safe channels of communication by which problems and solutions can be communicated to line and whole college managers and decision making bodies.

Having established these quality improvement teams and channels of communication,

managers will need to ensure that the team members have been trained in the skills and techniques of work process analysis, problem identification and solving and collaborative group working. It will also be advantageous to establish a team of staff who have an overarching leadership, advice and support function in the quality improvement process. The members of this team will need to be representative of all of the working groups and management levels within the college and will need in depth training in quality philosophy, systems and techniques. In support of these activities there will be a need to provide systems to document defined quality requirements and working procedures.

Expert advice and training on assurance and monitoring systems should be sought. Wherever possible these functions should be in the control of the quality improvement teams but with some impartial auditing. It is self evident, but sometimes overlooked, that any audit process must involve customer consultation on their level of satisfaction on the achievement of quality requirements. The quality loop will then ensure that corrective action is taken where a failure to meet a requirement has been identified.

An essential prerequisite for success in the quality improvement programme is the creation of an organisational culture that is supportive of the aims and processes of total quality. The first step for this will have been taken by involving all staff in the identification and expression of shared organisational values. There are some cultural characteristics which are essential to enable the process to succeed. Perhaps most vital of these is a real commitment to a no blame culture. Open communication is also a vital ingredient with everyone believing that a genuine attempt will be made to understand and to trust the intentions of the communicators. The culture will also be one in which it is expected that people will act; education is all too prone to analysing problems and spending an inordinate amount of time and energy on finding the intellectually and ideologically pure solution only to move on to the next problem before corrective action has been taken. Thus at all levels there will need to be a commitment to act, or at the very least to respond even if only to explain why a suggested solution cannot be implemented, within a specified and short time scale.

Thus a total quality culture will have: shared values, commitment to always getting it right, open and explicit communication, time for teamwork, training in quality, total involvement, sensitivity to others' needs.

ONE COLLEGE'S EXPERIENCE OF IMPLEMENTING TOTAL QUALITY

Background Information

Mid Cornwall and Saltash Colleges had, supported by a county wide project, developed systems and expertise in some aspects of quality assurance through a process of customer consultation based on student questionnaires adapted by course teams from work undertaken in Avon. The students were consulted, in detail, on their satisfaction with access arrangements (everything up to settling into the course), on the quality of their learning and assessment experiences and the validity of their course for the next stage of their lives (further or higher education or employment). Employers and/or further and higher education would also be consulted at the validity stage. The information gained from the questionnaires was used by the course team in their course review processes and as an aid to action planning for improvement.

A number of full time courses had implemented this approach and the desire was to spread the process to all full and part time courses.

The college management team had consciously decided not to seek course evaluation feedback from the customer consultation processes as they wished, at least in the pilot phase, to ensure that course teams owned the process and the information and that staff did not feel threatened or defensive.

However, after the first year of the project, the course teams themselves felt that they would like to have clear ways of communicating information and requests to management at least about those issues which could be resolved by management or whole institution decision making groups.

There was also a feeling by key members of the management team that the time was right to implement a whole college quality system both in response to an internal desire to do so and in response to external pressures. The College wished to develop and implement a quality approach which matched its culture rather than adopt a prescribed quality management system such as ISO 9000. They were attracted by what they had learned of TQM and by the notion of continuous, or incremental quality improvement.

Some funding was available from a Regional Department of Employment project.

Beginning the Process

The College's management team decided to use a consultant to assist them with the initial stages of investigating TQM, to provide some management training in TQM and to help facilitate the introduction of their chosen approach to the whole staff of the College.

The first activity was a development day for the College management team in which they explored the essential concepts of TQM and used TQM techniques to generate a draft College Quality Policy and draft College Quality Aims.

The second phase was to consult the College Governors who had a crucial role in management commitment and an evening session for managers and governors was held in which a presentation on quality systems in general and in education was made. The focus was on TQM as providing a framework which fitted College culture, which could if required embrace ISO 9000 and which could build on the work undertaken by the course teams in integrating regular and rigorous customer consultation into course review processes. During structured discussions, following the presentation, governors supported the approach that was recommended. Additionally a high degree of experience in industrial applications of TQM was identified and their assistance was enlisted with the next phase of the programme.

The third phase was to launch the TQM programme with the whole College staff. An afternoon and evening session was organised to which all full time staff and part time employees who worked more than ten hours per week were invited. Management commitment to the programme was effectively demonstrated by the large investment of resources that such an event entailed, by the closing of the College for the afternoon and by the high profile that they took during the proceedings.

Presentations by two College Governors with industrial experience of TQM, by the consultant and by the College Principal and Vice Principal (Development) were made and questions sought. Workshop sessions followed in which staff were asked to comment on the draft Quality Policy and the draft Quality Aims and to identify key areas within the College that should be the subject of the first phase of the quality improvement programme.

Following this session with all staff the suggestions for areas for quality improvement were circulated and staff were invited to volunteer to be involved in the work. The College Quality Policy and Aims were approved by the Board of Governors and circulated to all staff.

A structure for teams was agreed and established with the overarching role being taken by a Quality Steering Group and with four Quality Improvement Groups to address the four areas for whole College improvement that had been identified. It was decided that a regular Quality Newsletter would be produced and distributed to staff.

The College also devised and administered a Quality Audit in the form of an attitude survey with all staff. It is intended to use the results of the survey to inform management but also as a benchmark against which the results of the whole College Quality Improvements Groups' work can be measured.

Training in some of the tools and techniques of TQM and in group working was undertaken by the College management team. They have begun to cascade this training to members of the Quality Improvement Groups.

Some Outcomes from the Programme

The first action, the senior management development day, took place in October 1991. Identifiable outcomes to date include:

- A College Quality Policy
- College Quality Aims
- Four teams to address quality improvement issues that relate to the whole College and which were identified as priorities at the whole staff event: Communication, Management, Accommodation, Course Evaluation and Review
- A Quality Steering Group
- A staff attitude survey, the results of which have been communicated to all staff
- Extension of the customer consultation and course review processes with the intention of spreading this to cover all College courses
- The Quality Improvement Group for Communication has recommended that details from management meetings should be more widely publicised and that senior staff should make themselves more accessible. As a result the Principal and Vice Principals will attend meetings by invitation and will be available for informal contact. Agendas and summary notes of Heads of Department Meetings are posted on notice boards and widely circulated to aid communication and accurate and timely information flow
- Four editions of the Quality Newsletter have been published
- The Quality Improvement Group for Accommodation is reviewing computer programmes for time tabling and room use. A system for reporting and rectifying "minor" repairs/replacements has been devised and implemented
- The Quality Improvement Group for Management has reviewed the College committee structure and has prepared recommendations for a more effective, efficient and accountable use of committees
- The Quality Improvement Group for Course Evaluation and Review has received the results of an audit devised by the Curriculum Committee and is using these to evolve a systematic approach for the whole College
- Senior staff have been trained in aspects of quality improvement
- A large number of College staff have been consulted and involved. Some are taking an active part in whole College quality improvement initiatives

- The Governors have approved a Mission Statement for the College and strategic aims for the College for the next five years. These have been much influenced by the information gained and the culture established from the quality initiatives
- The College has discussed the Investors in People programme with DCTEC and has registered an interest in an initial assessment visit

6 Performance management in a competence framework

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INTRODUCTION

In the current economic climate and with 1992 and the open European market upon us, companies are becoming increasingly aware of the importance of investing in training. It is, however, recognised that training per se is not always a good thing. Training needs to be targeted. Corporate goals are identified and the training required for individuals to help the company meet those business goals can be designed and introduced.

This approach has the advantage of being cost effective in helping the company meet its objectives but is also motivating for individual staff who feel that their training requirements are being met, helping them to carry our their jobs more effectively, whilst also recognising their current skills.

Nationally there is a thrust towards the development of standards of competence in all occupational sectors and the introduction of training programmes based on these national standards. This may or may not be linked to the acquisition of National Vocational Qualifications (NVQs).

Most companies appear to accept this approach for craft and technician grades and for clerical and administrative support staff. There is a tendency to feel that it is not possible to identify standards of competence for managerial and professional level staff. This is at best a questionable premise, probably based on a misconception of the definition of "competence". A competence-based approach should not merely be a list of tasks but should reflect broader issues such as task management, health and safety, and the ability to deal with organisational environments, relationships with other people and unexpected events (NCVQ 1991). It is therefore not only possible to identify occupational competence for managers, it is positively desirable in order to ensure targeted, cost effective training.

It is probable that some of the resistance to the "competence" model is due to the intimidating amount of jargon which is associated with it. Some of the jargon associated with NVQs includes: competence, standards, unit, element, performance criteria and range statement. Introducing these specialised terms into a company training and development programme can be intimidating for all concerned, be they line manager, trainer or employee undergoing training. I will demonstrate here the relevance of competence in a performance management system and the relationship between established management terminology and "competence" terminology. A performance management model will be described, which is generic but which can be tailored by individual organisations and has been introduced in a number of companies as a key contribution to their total quality approach.

WHAT IS COMPETENCE?

Some of the concerns about the introduction of NVQs, particularly from managers, is a perception that "competence" refers to the possession of practical or manual skills. This was perhaps reinforced by the early accreditation of NVQs, many of which were largely associated with practical skills. In fact the NCVQ definition of competence, whilst it certainly does recognise the need for the performance of tasks, is much broader. An individual must also possess the relevant knowledge and understanding to perform

effectively in the work situation.

Competence then, in NVQ terminology, is much broader than is often perceived and applies from trainee to senior management.

At this stage it will be useful to give some broad definitions of NVQ terms, before discussing the performance management model and why performance management is an important factor in the establishment of total quality.

NVQ Definitions

- Unit of Competence - discrete work area
- Element of Competence - describes what a trainee should be able to do
- Performance Criteria - specify the standards of performance
- Range Statement - details of the range of applications or contexts across which the performance criteria apply
- Essential Knowledge - underpins performance

WHAT IS PERFORMANCE MANAGEMENT?

There are probably as many different performance management models as there are definitions of "competence". Probably the most familiar one is the annual appraisal system. Often the appraisal is based on the subjective judgement of the individual line manager, who considers personal attributes such as: contribution to the team, co-operation, attitude, effort and promotability.

The Performance Management Model described here differs in that it is:

- an on-going cyclical model rather than an annual interview
- based on clear objectives, agreed between job holder and line management
- based on continuous review of progress
- not dependent on an annual performance review

The model is essentially a **three stage** cyclical model - see figure 6.1.

STAGE ONE: JOB CLARIFICATION

This stage involves line manager and job holder working together to agree the objectives of the job and identify areas of training and development required to enable the job holder to meet the objectives. From this a personal development plan can be produced, detailing:

- clear objectives
- training and development requirements
- agreed timescales
- agreed monitoring and review process

STAGE TWO: MONITORING AND REVIEW

This is an essential part of the performance review cycle and involves the line manager in taking responsibility for reviewing progress against the agreed objectives and providing constructive feedback. There may be a requirement to re-negotiate the personal development plan at this stage.

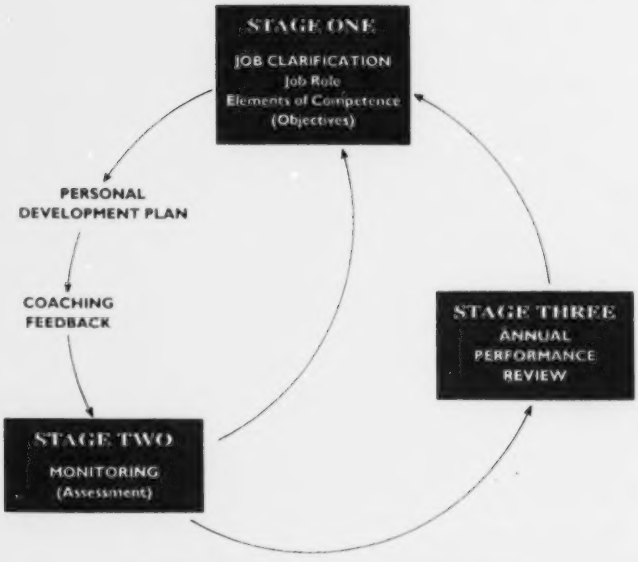

Figure 6.1 *The performance review cycle*

STAGE THREE: ANNUAL PERFORMANCE REVIEW

This may be seen as part of the on-going review process or it may be that the organisation's practice requires an appraisal interview. Either way, the "annual review" should present no unpleasant surprises to the candidate. He/she will be aware of progress and of steps which need to be taken to meet objectives.

In describing the performance management model, terms which will be familiar to human resource and training managers have been used. It is our belief that there is no conflict between this model and the competence framework and below we suggest some broad "equivalences" of terminology. We recognise that this is probably an over simplication. Nonetheless we believe it provides a platform for employers to begin to relate to the national jargon attached to competence terminology.

TERMINOLOGY

COMPETENCE	PERFORMANCE MANAGEMENT
Functional Analysis	Job Clarification
Key Job Role	Job Purpose Statement
Units of Competence	Key Results Areas
Elements of Competence	Objectives
Performance Criteria	Success Criteria
Outcome Based	Outcome Based
Assessment	Monitoring

WHAT ARE THE ADVANTAGES OF A PERFORMANCE REVIEW CYCLE?

It is suggested that advantages for the organisation are:

- Corporate objectives are clarified and publicised
- People are working towards the achievement of corporate goals
- Overall performance is raised
- Identification of resources required to achieve objectives takes place
- Means for monitoring progress are provided
- Training and development needs are identified

Advantages for the individual are:

- Clarification of the job, purpose and goals
- Increased motivation
- A basis for a two-way discussion is formed
- A basis for monitoring progress and formative feedback is provided
- Resource requirements and constraints are identified
- Development needs are identified
- Links may be made with National Standards of Competence and Nationally recognised qualifications

THE LINK WITH TOTAL QUALITY

More and more companies are beginning to investigate "Total Quality Management" as a vehicle to increase organisational efficiency and effectiveness. There are a number of TQM models and initiatives, but most stress the need for: clear corporate goals and objectives; clear individual goals and objectives linked to the corporate goals; investment in relevant training and development; on-going staff monitoring (assessment) against agreed objectives.

A recent initiative which makes explicit these features is 'Investors in People'.

An Investor in People:

- Makes a public commitment from the top to develop all employees to achieve its business objectives
- Regularly reviews the training and development needs of all employees
- Takes action to train and develop individuals on recruitment and throughout their employment
- Evaluates the investment in training and development to assess achievement and improve future effectiveness

The Confederation of British Industry (1991) published World Class Targets, which outlined a series of progressive achievement targets for individuals and organisations, which must be attained if Britain is to maintain a competitive edge in world markets. The introduction of a structured performance management system will help with that task.

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7 Quality in further education: an unchanging agenda

David Shepherdson, *West Sussex Advisory and Inspection Service, Chichester, West Sussex, UK*

INTRODUCTION

> "Politicians' time-scales are always much shorter than anyone else's; there are always new agendas for LEAs and we are in a state of perpetual change in education. However, one agenda will never change, and that is to provide the best educational opportunities for all ... and that is what we must do" (Sir Roy Harding 1990).

The focus here is on the unchanging agenda of quality development from a Local Education Authority (LEA) perspective. The West Sussex Initiative is based on the author's experience of working with the LEA quality development team in Birmingham, and it is primarily concerned with developing Total Quality Management (TQM) systems in all four Further Education Colleges in West Sussex. It is concerned with a belief in the self-evaluating professional working within the self-evaluating institution. The Advisory and Inspection Service is supporting the development of systematic training in monitoring and evaluation techniques for all college staff, through a programme of workshops. The process is designed to equip whole institutions to achieve "self-critical academic maturity" within a specified timescale.

THE INITIATIVE

The overall aim of the initiative is to link the demands for accountability with the desire for improvement; often they are seen to be mutually incompatible. Improving can be a statistical exercise, fulfilling requirements in terms of performance indicators but, when linked to the qualitative process of developing a narrative related to classroom practice, the two processes can be both developmental and powerful. A keynote of the Initiative is to gain the commitment of identified teams of staff in FE colleges to the idea of monitoring and evaluation as a positive and educative process in itself. Too often, quality is associated only with audit, review and inspection. If quality is genuinely in-built and integral to the whole institution, the integrity of the process may eliminate the fault-finding, problem-solving focus of many quality systems.

The identified teams are asked to work through 20 tasks in the handbook over one year. This is supported by systematic staff development and accredited training in evaluation techniques for team leaders. The teams identify 'quality gaps' in the area of provision for which they are responsible. These 'gaps' are then converted to quality targets that are tackled by the team itself. Notionally each team will identify 3 targets to be met each term. In order to address these targets, the team formulates an action plan identifying what is to be tackled, by whom, how and where. This provides the basis for a bid to a central college group (the Curriculum Review and Development Group) which will then approve or modify the bid for funding. The funding may take the form of release time, equipment or materials. This forms the basis of reciprocal contracting - where the team contracts to deliver on its own targets and the Review Group contracts to provide support for the team to meet its targets. The Senior management team would contract to deliver on its own targets in the same way as all other teams.

All targets and timescales are 'public knowledge' and conform to the College strategic framework for quality. This means that the College Development Plan can be enacted through the contracting process and the regular review of progress each term.

IMPLEMENTING THE INITIATIVE

The first stage is to agree some key principles that provide the focus of improvement. Many teams include classroom practice, the quality of teaching and learning or the interaction between lecture and students. These concepts need to be dis-aggregated into a series of developmental tasks. At this stage, it is useful to begin the process of identifying critical success factors or criteria for making judgements about the success of the improvement process. Although a necessarily lengthy process, it is essential to ensure a commitment through ownership - the team decides what the issues are, and what the criteria for success will be. The accredited training programme provides the necessary support for key individuals to lead the programme as 'professional evaluation'.

It is important that the central group that receives bids from teams undertakes a monitoring and evaluation role for the whole college. This Curriculum Review and Development Group is normally representative of all levels of staffing and operates rotation of membership to ensure full representation over several years. The CRDG remit is based on the College Development Plan and Quality Development strategy for the institution. Team progress is monitored by brief half-termly reporting and end of term reviews.

The reciprocal contracting of the TQM system extends to learner contracts as an integral part of "entitlement". This replicates a work contract for students and would include enhanced opportunities for learner support and study skills programmes.

METHODOLOGY OF THE INITIATIVE

The methodology of the initiative is based on the work of David Kölb and D A Schon. This model of experiential learning and the reflective practitioner, exemplified through the research and development function, is not usually part of the FE College system. If time for 'reflection' is built into the teaching and learning programme, it becomes possible to identify needs and meet planning requirements within "normal practice". The teams therefore use a variety of monitoring and evaluation techniques, each suited to its own purpose. The widespread use of questionnaires is generally found to be of limited use. Both students and staff can become "anaesthetised" to their use and the quality of some information is doubtful. By using a variety of methods, it is possible to triangulate on issues, and gain a much closer insight into the origins and nature of the issues. Many of the so-called problems identified by some quality systems are products of the system itself rather than being symptomatic of real underlying course culture.

Evaluation techniques can be built into learning programmes, using tutorials, seminars and workshops. The common complaint is that "we don't have time ... (for quality)." Teaching hours are being reduced and many staff are under considerable stress as a direct result of increased administration. A possible solution lies in revisiting teaching methodologies, timetabling and room allocations. It becomes necessary for the team to have increasing ownership of the means to deliver the curriculum that meet their identified needs and the needs of the students more effectively.

Traditionally colleges have been driven by SSRs and the requirements of resource allocations based on student numbers. Increasingly, the notion of performance related funding may produce a more efficient and effective way of delivering learning programmes that will incorporate "self-critical academic maturity". These are the issues that can be picked up very quickly by the 'empowered' course team. Their initial solutions to perceived problems may be crude, but they offer a genuine R and D function that many commercial operations value highly. The emphasis on discrete elements of college operations eg. marketing, recruitment, quality, tends to fragment and dispel responses such as - "its someone else's responsibility". You cannot delegate or subcontract quality and the fundamental approach of TQM lies in a set of values and attitudes that embody commitment to continuous improvement. In the same way, quality is not a project, nor is it a standard to be achieved. This serves only to limit achievement and leads to a "lip-service" model of the way that things should be done.

QUALITY IMPROVEMENT

The "steps" to quality improvement begin with a view about "what do we mean by quality". Programme Area teams may have a different view to that of the management teams; providing interesting perspectives on the college's view of quality. Agreeing common principles is part of the first reflective stage. It is based primarily on experience (as in the Kölb model), and may be a function of a series of critical incidents, concerns, problems, good ideas or hunches.

These form the basis of the keynote principles to be outlined in the college Quality Development Action Plan, that outlines the "mission" and incorporates commitment to specific quality attributes.

Secondly, decisions about the composition of teams will provide a basis for identifying areas of "common effort". In itself an interesting exercise, this can identify the "black holes" of provision and the "team that never meets" or the "team that never was". Team forming provides a basis for more collaborative working and for improved communications and shared resources. Indeed, the benefits of this single exercise often promote a more integrative approach to all aspects of the college provision and lead to consideration of structured responses (for example, in relation to modularisation).

The third stage is for each team to identify their own response to "quality gaps", as perceived by the team. These gaps should become targets for improvement, recognising that in some cases there are resource implications for management attention. Initially, it is useful to identify smaller (incremental) issues for improvement, rather than medium or long term targets. If all teams engage in the process, by contracting to deliver, the whole college can move rapidly to a stage of critical mass. At this point the management strategy should incorporate a moderating influence, ensuring a degree of realism and consistency in both targeting and methodology. This is important to ensure that diversity of approach does not preclude a corporateness of purpose.

It would be possible for a system to be "bought in" - but this does not generally engender ownership or indeed, commitment by all. Most alternatives are superstructures rather than infrastructures - built on, rather than built in. It is essential to grow the system within the organisation rather than impose a structure for accountability; this is because the reaction to the exogenous system is often to subvert or at least to ignore it. Systems for accountability can often be counter productive, generating whole sub-systems and consuming large amounts of time and energy.

CONCLUSIONS

The advantages of TQM and the "home grown" model of quality improvement mean that ownership, empowerment and commitment go hand-in-hand, leading to real progress towards commonly agreed goals. There is no reason why this should not meet external demands for accountability and, additionally, provide the basis for systematic improvement.

The real benefits are usually in terms of creating genuine enthusiasm and motivation; creating some space for reflecting on what business we really are in, and finally creating the basis for a continuous quest to provide the very best learning opportunities for the benefit of the students.

There are several key points that are embodied within the West Sussex Initiative. The unchanging agenda is concerned with continuous improvement with the aim of improving the quality of the learning experience, increasing participation in training and education and improving attainment. Above all, quality is judged by the customer and requires us to deliver consistently above expectations. In this way it is quite feasible that educational ideals and economic realities are not necessarily mutually exclusive.

8 Defining quality in higher education - the stakeholder approach

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QUALITY IN HIGHER EDUCATION - THE LAST DECADE

During the last decade quality has become an important issue in higher education for two separate, but related, reasons. In the first place there has been a drive for greater accountability by the government for the way in which higher education spends the funds allocated to it. Society is no longer prepared to take on trust that higher education is providing value for money. Higher Education is being asked to demonstrate that it is spending public money efficiently and effectively. This parallels approaches to other public services, such as Health (Cave et al 1990).

In part, this demand for greater public accountability came from a sense that higher education had not been responding effectively to the needs of a modern industrial society. So, in the 1985 Green Paper "The Development of Higher Education into the 1990s" we find:

> "there is continuing concern that higher education does not respond sufficiently to changing needs. This may be due in part to disincentives to change within higher education, including over-dependence on public funding, and to failures in communication between employers and institutions"

and:

> "The Government believes that it is vital for our higher education to contribute more effectively to the improvement of the performance of the economy" (DES 1985).

The government's commitment to ensuring greater public accountability for public expenditure on higher education has continued throughout the 1980s. Its stance is demonstrated by the following extract from a letter from the Secretary of State to the Head of the PCFC:

> "I shall however expect to see two key features. The first is a means of specifying clearly what polytechnics and colleges are expected to provide in return for public funds. The second is a systematic method of monitoring institutional performance. I attach particular importance to the latter, since without measures of performance, the Council will have the means neither of satisfying itself that institutions are providing what has been promised at acceptable quality, nor of making comparative assessments of institutions as a basis for future allocations of grant" (Baker 1988).

This drive for greater accountability has not been restricted to the United Kingdom but should be viewed as part of an international trend. Similar developments have occurred in many other countries (Neave 1986; Goedegebuure et al 1990; Teather 1990).

The second important development that has influenced the quality debate in higher education in the United Kingdom has been the move away from an elitist system of higher education towards one of mass participation without a corresponding increase in finances. This reduction in the unit of resource in higher education and the increase in numbers entering the higher education system, many without the traditional entry requirements, has led some to argue that quality must inevitably suffer.

The debate has gained added impetus through the publication in 1991 of the White Paper 'Higher Education - A New Framework' and the subsequent Bill on Further and Higher Education which was enacted in March 1992. The new law heralded significant changes in the structure of higher education in the United Kingdom. All of the polytechnics were granted degree awarding powers and the Council for National Academic Awards, a major quality assurance body for the polytechnics and colleges sector, was wound up. A single higher education funding council was established for England with similar arrangements for Wales, Scotland and Northern Ireland. The new legislation required the funding council to establish a Quality Assessment Committee and to "secure that provision is made for assessing the quality of education provided in institutions ..." (Further and Higher Education Bill 1992). The institutions have been encouraged by the government to set up their own Quality and Access Organisation to focus on the audit of quality assurance systems.

DEFINING QUALITY

What is quality in higher education and how do you go about assessing it? Quality is a concept, like freedom or justice, of which people have intuitive understanding but whose meaning they find difficult to articulate. Does it mean the same to everybody or do people use the same word to mean very different things? The Quality in Higher Education (QHE) project is looking at precisely these issues. The Project was launched in September 1991. It is sponsored by a partnership of education, government and business. There are currently 27 sponsors in the United Kingdom including the Department of Education and Science, the funding councils, accrediting bodies, major employers, employers' organisations, higher education institutions, research and training organisations. It is independent of any single organisation or institution but its physical base is the University of Central England. Each of the sponsors is represented on the project steering group which meets about once every three months. Sponsors are expected to take an active part in determining the scope and development of the project.

The ultimate aim of the project is to develop a methodology for assessing quality in higher education. However, before you can develop techniques for assessing something you have to be clear what it is that you are trying to assess. The first year of the project is being spent establishing a clear set of criteria for judging quality in higher education.

An underlying hypothesis for the first phase of the project is that quality in the context of higher education is a relative concept. Its definition varies according to:

- which aspect or dimension of the higher education process is the focus of attention;
- who is making the assessment;
- the purpose for which the assessment is being made.

THE STAKEHOLDER APPROACH

In order to test this hypothesis the research team has identified a range of interest groups or "stakeholders" in higher education, eight in all: students; employers; 'government', subdivided into ministerial departments (DES, DTI, DE); funding councils; teaching staff in higher education institutions; managerial staff in higher education institutions (including representative bodies such as CDP, CVCP, and administrative and support staff); accrediting bodies (including the professions); assessment bodies (HMI, the Audit Unit and the new Assessment Unit).

Our aim is to find out the views on quality of each of these groups by looking at:

- the focus of interest of each group - is the focus on the input, process or output of higher education; is it on teaching or research?
- the underlying definitions of quality used by the groups and their political and philosophical underpinnings.

The stakeholder approach is an analytical tool which other researchers have used to look at quality in higher education (Vroeijenstijn 1991; Yorke 1991). Primarily, it has been used in the Netherlands to try and establish a set of performance indicators for assessing quality which would have wide credibility (Dochy et al 1990). The crucial difference between this research and our own is that, at this stage, we are not looking at indicators of quality but at the criteria for judging quality itself. We are trying to find out what constitutes teaching quality rather than how you might measure that teaching quality is present (which might involve, for the sake of argument, looking at the degree classifications of graduates).

To use the stakeholder approach effectively means that there should be no assumptions about how a particular group might define quality nor about its main focus of interest. The project does not concentrate specifically on the quality of teaching and learning or research or institutional quality - anything may be considered relevant.

At the end of the first stage of the project, we aim to have a set of quality criteria ranked in order of preference, which reflect the views of all the stakeholders. At one end of the spectrum each stakeholder group might think about quality in a different way and its focus of attention might also be different. More likely, however, there will be some convergence and overlap of views on particular issues.

RESEARCH METHODS

A variety of methods is being used to discover the views of the different stakeholders. These have been combined into three broad groups for practical purposes.

Staff and Students in Higher Education

A questionnaire based survey is being conducted covering sixteen institutions selected according to territorial, cultural and structural criteria. Within each institution, a representative stratified sample of students (approximately 400) and random sample of 400 staff (teaching and non-teaching) is being surveyed.

To design the questionnaire, we undertook a literature search to identify the quality criteria and measures currently in use by bodies such as HMI, PCFC, UFC, CDP, CVCP, CNAA, BTEC, NATFHE and the AUT. Using the research conducted by the Student Satisfaction Project at Birmingham Polytechnic (Mazelan et al 1991) and parallel work by the project team on employers' views, we identified around 300 criteria. These were distilled down, by merging overlapping criteria, to around 100 different elements.

We then attempted to specify more clearly the "definitions" of quality. "Definition" was considered too grandiose and so we reverted to the rather less precise "ways of thinking about" quality. From this we identified nine in total:

- Meeting the requirements of the student.
- Enhancing the knowledge, abilities and skills of students.
- Empowering students to effect changes in their education.

- Fulfilling the stated intention (or mission) of the institution.
- Providing mechanisms to ensure that students get what has been offered.
- Striving for excellence in all aspects of the institution and programmes of study.
- Making efficient and cost effective use of educational resources.
- Checking that standards have been met.
- Providing a distinctive, special and "high class" education.

Staff and students are asked to indicate how important they think the criteria are for judging quality in higher education and which "way of thinking about quality" seems most appropriate to them.

Government, Funding Agencies, Accrediting Agencies

This work is ongoing - a review of published material has been conducted which will be followed up by interview-based verification.

Employers

The following methods were selected and have been used: interviews with organisations representing employers; a short employer questionnaire; two employer seminars.

Interviews with employer representatives on the steering group took place to help determine what methods should be used to find out the views of employers about quality in higher education and the character of the employer questionnaire and seminars. This source was backed up with two in-depth interviews with organisations representing employers: the Confederation for British Industry (CBI) and the Council for Industry and Higher Education.

As a result of the interviews, the research team reached the conclusion that a focused approach, concentrating specifically on the outputs of higher education relevant to employers, was most likely to yield results.

Higher education can be viewed as a process which has two main outputs: an educated workforce and research (Cave et al 1991). The research team has sought the views of employers on these outputs in two ways: a short questionnaire on graduate recruitment; two seminars, one focusing on quality in relation to an educated workforce and the other on quality in relation to research, consultancy and sponsorship.

The discussions during the two seminars have been drawn together to produce a position statement on employers' views on quality in higher education and a set of criteria for judging quality.

The project steering group itself provides another resource as the majority of stakeholder groups are represented. The project has been able to make use of the group, via discussions within meetings, depth-interviews with members and contacts with other key informants.

FUTURE DEVELOPMENT OF THE PROJECT

During the second phase of the project, quality assessment techniques will be tested within higher education institutions. The criteria identified in the first stage will be used as a basis for developing quality indicators. A methodology will be developed incorporating these indicators. Although it is difficult to be clear about the methodology at this stage, it is likely that the research team will seek the cooperation of institutions to monitor and evaluate methods which are already being developed and used. In the

case of methods that are not currently being utilised in UK higher education, a selected number of institutions will be invited to take part in the testing and evaluation exercise.

It is likely that certain approaches to quality management, such as BS5750 and Total Quality Management, will also be evaluated. The objective here will be to see whether these approaches can be successfully adopted for use in the context of higher education.

How successful these techniques are in measuring or managing the quality criteria identified in phase one of the project will be the focus of the evaluation.

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Section 2: Implementing Quality in Organisations

The contributions here are largely in the form of case studies that describe in some detail how quality approaches have been implemented in specific organisations. Taken together they represent a significant range and type of organisation.

At one end of the scale, in "TQ implementation - cultural issues and training", we find implementation in a very large multi-national company described by **Brian Hurley**, with its problems of worldwide permeation and scale. **John Oakland and Leslie Porter** describe the application of their European model of quality in the context of a single university in "Developing the European quality model".

Robert Newton, in "Strategic quality management", argues for and takes a more strategic view of quality management in his description of the implementation of quality approaches in his Training and Enterprise Council.

The strategies that were employed in quality initiatives in a former polytechnic are explained by **John Heap and Hazel Solomon**, who also present a balance sheet of the "Profits and pitfalls in establishing a qualytechnic". In a significant change of emphasis, **Patti Mazelan** and her colleagues focus specifically on the student and describe their work to elicit views of students that might inform the monitoring of quality in "Student satisfaction and perceptions of quality".

Douglas Edgar, in "Experiences in the design and conduct of enterprise audits", explores the methods and strategic approaches that can be taken in the complex, and often controversial, process of educational auditing. In "Monitoring the quality of quality control systems", **Henry Ellington and Gavin Ross** move into the realms of meta quality control as they describe and examine systems in their own higher education institution.

9 TQ implementation - cultural issues and training

Brian Hurley, *formerly Quality Implementation Manager, BP Chemicals Ltd*

INTRODUCTION

BP Chemicals, one of four main businesses in the BP group, took 20,000 employees, at 90 locations worldwide into a Philip Crosby based total quality process in 1987.

The early successes and lessons highlighted the need to reinforce and recommit everyone to take full ownership. A team was set up in 1990 to catalyse and focus this recommitment to quality implementation.

The team, led by the author, and assisted by outside training consultants, developed a new in-house training package and process, built on the Crosby phase, but customised to BP Chemical's needs. A BP group initiative for overall culture change reinforced the emphasis on combining hard and soft factors in the integrated training process then used to launch the BP Chemicals recommitment, which was called "Towards 2000 with Total Quality".

The training package and processes demanded follow-up into "business as usual" by requiring the line and senior management role models to lead the change process by personal involvement in training activities, as the platform for new ways of thinking and working. This raised issues and barriers, created opportunities and benefits which are outlined here.

Total quality implementation as the foundation for underpinning a culture focused on customer satisfaction, and the need to continue our value improvement of all work processes, is hard work but not optional.

CONTEXT

The BP Group in 1991 comprised the main businesses indicated in Figure 9.1.

	Employees
Exploration and Production	10,200
Refining and Marketing	56,000
Chemicals	20,400
Nutrition	20,600
Miscellaneous and Corporate	9,600
Total Worldwide	116,800

Figure 9.1 *BP business and employee levels (1991)*

BP Chemicals had been a loss making part of BP in the early 1980's but by focusing on core businesses, and reducing costs and people numbers during 1980 to 1984, we became profitable. We alone in the BP group embarked on Total Quality (TQ) in late 1987 to establish a culture of continuous improvement focused on "Internal" and "External" customer satisfaction.

We are organised into business areas, cross matrixed with a set of essential functions, which characterise our company's approach to the way we operate. A snapshot of our recent business performance and scale for 1989, 1990 and 1991 is indicated in Figure 9.2.

	1989	1990	1991
Turnover(£m)	3,503	3,164	3,064
Profit (£m)	540	129	NIL
ROCE (%)	28	6	NIL
Capital Employed (£m)	2,143	2,081	2,436
Employees	25,000	20,400	20,000
Locations	90	70	70

Figure 9.2 *BP chemicals recent business indicators*

STARTING THE TQM JOURNEY

The principal reason for starting TQ was to secure competitiveness by a strategy based on a vision that we needed to:

- Compete continuously for customers, ie. be preferred suppliers.
- Create a culture of continuous improvement of all work, as a process.
- Improve the participation, job satisfaction and value of all employees.
- Focus on process management.

In short, we needed to improve our effectiveness at adding value in a series of chains both internally and especially across the external supplier and customer interfaces.

Our initial priorities were the internal processes, believing we had to learn ourselves before offering TQ to our customers, and demanding it from our suppliers.

Our model of TQ embraces three key elements: systems assurance guidance, team work, techniques and tools.

Various parts of our organisation had been pressed to quality assurance (ISO9000) and some techniques by customer demand. Our thrust in 1987 was based on a training programme for all employees, using Philip Crosby's Total Quality philosophy and training package which is founded on the four absolutes of:

- conformance to requirements
- system of prevention
- standard - defect free
- measurement - price of non-conformance.

I will not dwell on quality assurance (BS5750/ISO9000) or the techniques and tools of quality except to say they are essential to provide a hard disciplined and systematic way of applying the philosophy of TQ, to analyse, improve and measure process variability and capability.

Our experience with the Crosby approach in 1987/1988 was long on philosophy, and a fine start giving us a common language, in many national tongues; but we had to develop our own answers to the key question "How to do it?"

RECOMMITMENT

In late 1988 we asked ourselves, "how well are we meeting the requirements?"

Not only did we not have clear answers, but many parts of the organisation had mixed messages, or they said they had. We conducted a series of workshops asking three basic questions: "Where are we now?"; "Where do we need to be?"; "What do we have to do to get there?"

We had learnt some lessons:

- Clear demonstration of commitment at the top is essential
- TQ implementation can result in stress at all levels
- Fear and insecurity can be outcomes
- People don't like to admit problems and failures
- Problem prevention is not as much fun as problem fixing.

Also we realised the need to focus our quality improvement on a project by project basis.

A major requirement was to take ownership and, to this end, we had started and rapidly completed a totally new in house customised training package and process. It was founded on enhancement of the basic Crosby philosophy but added our own examples and two special new features.

We emphasised the use of good quality assurance and quality tools and techniques to focus on team projects - the hard issues. We also realised the need to address the main cultural barriers - the soft issues.

So, the two special features were the need to address culture and training in a TQ context.

CULTURE

What is culture? We discovered that everyone had their own view but no one could define it in terms suited to a multi-national industrial organisation which covered several countries each with its own ethnic and social culture. We did produce a model, which viewed culture as a product of process, structure and behaviour.

We recognised that our recommitment process needed to address the behavioural aspect in particular.

TRAINING

We used an in-house team, assisted by external training consultants, in a joint project which developed a comprehensive modular training package.

Our training was based on 3 main premises:

- that all work is a process and the horizontal value chain is the focus for teamwork and leadership.
- good prevention systems hold gains by preventing regression.
- to continuously improve, people must be engaged to drive an innovative dynamic, which we called the Four Stage Cycle of Continuous Improvement - the core of our TQ approach (see Figure 9.3).

But the follow-through depends entirely on the line team leaders. To assist in this we used our own line managers as trainers, which required a huge investment in selection, training and now support and maintenance. Conflicts of time and line management participation become important - but we believe these pain barriers are unavoidable if *ownership* is to be achieved.

Quality has to become part of "business as usual" to facilitate the changes from segmental, functional and often vertically focussed people, overburdened by systems, to a business and work approach based on innovation and external customer requirements.

As we were about to deliver our new package, the BP Group initiative of "Project 90" gave new emphasis to the key factors which should be addressed to stimulate and get best effect from TQ: process, structure and behaviour.

We had recognised behaviour in our new training modules but Project 1990 re-emphasised this in terms of a BP group vision: "The most successful oil company" and some explicit values related to a variety of stakeholders: employees, suppliers, community, customers and shareholders.

We had begun restructuring and delayering. On the behaviour side, we have resolved that our employees and managers must become capable of a number of essential behaviours: open thinking, personal impact, empowering and networking. These are now incorporated into our staff appraisal, development, reward and recognition processes.

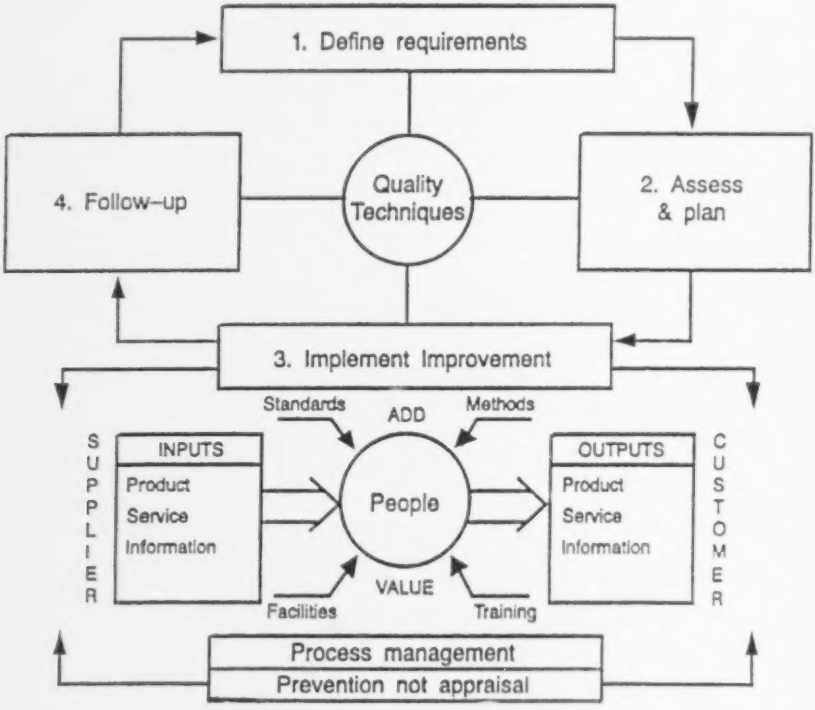

Figure 9.3 *Cycle of continuous improvement*

TRAINING AND CULTURAL ISSUES

Reference has been made to the new training elements addressing behaviour and leadership. The training process in all of this was deliberately interactive and the Board were the first to use the new material by setting aside two whole days.

We chose to build the training on well established material, some of which was not new to many of our managers. They still need reminding of the 110 role models in our 20,000 strong organisation.

The training process was founded on line management creating the need for training, taking a lead in it and the support function satisfying that need - with good material and a process for training line managers to be the trainers. The fundamental lesson we got over about training, was that it is the beginning of a process and team leaders must own it and follow up if the training effort is to be valuable. In short "behaviour breeds behaviour".

The many elements that go to provide a TQ culture and the essential behaviours were identified in our material which was based on a range of theoretical perspectives:

- Team roles and group dynamics: leader, worker, achiever, reflector, maintainer.
- Teams and action-centred leadership: forming, storming, norming, performing.
- What makes good leaders: drive, dedication, competitiveness, honesty, realism and maturity.
- Effective leadership: vision, communication, trust, self-knowledge and positiveness.
- Continuum of style: tells, sells, consults, shares and delegates.

We have made a good start! Four years along our journey we had been reinforced by a BP group initiative that reinforces the process focus with the need to change behaviour.

So how is it in the real world of a large organisation; coping with recession? Here are some of the painful issues we continue to address and which require commitment and participation from the top.

Do the role models really value wealth creation and team work or has short term profit and self interest aggravated the class barriers to team work? In business terms, have we replaced "captains" of industry with "pirates"?

I am grateful to Rosabeth Moss Kanter (1985) for listing some relevant dilemmas and paradoxes: process needs management, participation by command, top orders middle to do, empowerment with resources, delegation not abdication, need for a 25 hour day, participation threatens status, what's in it for me, teams equalise individuals, belief in team synergy.

The changes we seek will only occur if we all perceive a need for a better world and a way to get there. We recognise there are behaviour issues which have to be tackled, and top management must lead the way. We can summarise the key forward issues: behaviour, line management ownership, staff selection, staff appraisal, training, promotion policy, recognition, continuous education, internal marketing and leadership participation.

CONCLUSION

Is it worth it? That is not the real question; we have no choice. Some of the issues are national, social and economic ones, but we have to bite the bullet. Total Quality seems to be the right vehicle. But it is worth it too! Despite most of what I've said about pain and barriers, there are gains and successes which prove the worth of embarking on TQ

as the process for underpinning all enterprises.

Let me finish with some good news, which encourages us to conclude that our journey so far has been successful. Two hundred and fifty quality line trainers, 90% certified to ISO 9000, a common language, changing behaviour, own training material/processes, improved supplier and customer alliances, quality cost savings approximately £120m over 3 years, all bear witness to the progress made.

Finally I mentioned the recession and business performance. You will note that in 1992 we just broke even. We believe that proves the value of embarking on TQ. In the last downturn of the early 1980's we made huge losses during a less severe recession.

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10 Developing the European quality model

John S Oakland and Leslie J Porter, *University of Bradford Management Centre, Bradford, UK*

INTRODUCTION

The University of Bradford's Management Centre is one of Europe's oldest and largest business schools. The Management Centre pursues an extensive programme of research that has earned an international reputation in many fields of study. It is a fully integrated business school, providing comprehensive and innovative programmes of management education for undergraduates, postgraduates and post-experience students. The interaction of students with experienced managers and staff from diverse educational and industrial backgrounds provides a stimulating and creative environment.

The Management Centre has a matrix structure with seven Professors, responsible for the subject groups of economics, financial management, international business, marketing, organisation behaviour, production and operations management, and total quality management. Non-professorial Programme Chairmen manage the undergraduate, postgraduate (MBA), doctoral, and executive development (EDP) programmes. There is also a Director and Assistant Director of the Centre who are both professors. The Director, Assistant Director, Programme Chairmen, and some Professors also sit on an "Executive Committee", which is the decision-making body of the Management Centre.

There are approximately eighty full-time academic and related staff, fifty non-academic staff, five hundred undergraduates, three hundred full-time and part-time MBA students and thirty doctoral students on site. Almost two thousand executives and managers from industry, commerce and the public sector pass through the EDP each year on various types of short course programmes, including the Executive MBA.

The establishment of the industry funded European Centre for Total Quality Management (ECTQM) in 1987 was a major innovation. The ECTQM is actively involved in research, teaching and advisory work in all areas of quality management. A wide range of students, including those on executive development programmes, experience TQM training and education at Bradford. The Centre is a member of EFQM and the TQM group are involved in many EFQM activities.

In the summer of 1990 it was decided to introduce TQM into the Management Centre itself using the expertise of the European Centre for TQM. The 1990's will be a very challenging phase in the life of the Management Centre. Business schools generally operate in an increasingly competitive environment and the Management Centre's future success will depend on the commitment of all its staff to the improvement of its processes.

AWARENESS AND ORGANISATION FOR TQM

The seven Professors held two TQM strategic planning workshops to examine the feasibility of introducing TQM into the Management Centre. A new mission statement was developed and the factors critical to the achievement of the mission were identified. There were seven critical success factors (CSFs) and associated critical processes were listed.

A model of TQM, figure 10.1, covering the main areas of the criteria of the European Quality Award was adopted for implementation at the Management Centre.

Figure 10.1 *The Bradford TQM model*

The consensus view was that TQM at the Centre should involve:

- Everyone striving to meet customer requirements - internally and externally.
- Managing business processes.
- Continuous improvement in everything we do.
- Open good communications.
- Participative management style and involvement of everyone.
- Documented, auditable systems for the way we do things.
- Teamwork, built around our processes.
- Training and education in the identification of processes and the tools and techniques of improvement.
- Empowering people to act wherever improvements can be made.

It was recognised that the necessary culture change will happen slowly and that the Management Centre's total quality culture would not be built overnight. There was a strong belief among the Professors that the TQM approach could be used at the Centre in a disciplined approach to never-ending improvement.

It was also recognised that to devise and implement a TQM process takes considerable time and dedication and it must be given the status of an executive project. It was also essential that any TQM initiatives be fully integrated into the Management Centre's operating philosophy and management systems. The Professors suggested to the Executive Committee that the Centre should embark seriously on a TQM implementation

programme, but pointed out that the commitment would be continually questioned and be weakened, perhaps destroyed, by any failure of the 'senior management' to support the initiatives.

THE QUALITY COUNCIL

It was decided that a Quality Council (QC) should be formed to guide the TQM process.

Purpose

The main purpose of the QC was to develop the Centre's culture into one of Total Quality, thereby ensuring that we identify, understand, and achieve our "mission".

Charter and Responsibilities

The members of the Quality Council were drawn from various levels in the organisation. The Council works within the strategic framework laid down by the Professors and the Executive Committee. The membership is the Director, two Professors (including the Professor of TQM as facilitator, and chairperson) two Programme Chairmen, a Lecturer, a Secretary and a Computer Officer (technician).

Their responsibilities include:

- Updating the Mission Statement
- Identifying the Critical Success Factors
- Providing overall strategic direction on TQM for the Management Centre
- Establishing plans for TQM implementation
- Setting up Process Quality Teams and Quality Action Teams to make improvements
- Reviewing progress and plans for quality improvement
- Revising plans for the development of TQM and process improvement

The Council acts as a senior problem-solving group. It holds meetings monthly, following the meeting of the Executive Committee to review quality strategy, implementation, progress, and improvement.

First Tasks

The QC reviewed the previous mission statement and found it to contain suitable components for the development of a new mission statement and critical success factors (CSFs). These were set down as follows, including a list of "Stakeholders":

Mission Statement

To be a growing centre of excellence in teaching and research in the disciplines of management.

To improve the practice of management, world-wide.

Critical Success Factors (CSFs)

1 We must have a UFC research rating of 5.
2 We need a demonstrably excellent reputation for an innovative practical approach.
3 We must have products and services which meet current and future market needs.
4 We need financial independence.
5 We need an excellent infrastructure.
6 We must have a stimulating and rewarding work environment.
7 We must achieve a critical mass of quality staff.
8 We need quality inputs.

These were deemed to be all necessary and together sufficient, for the Mission to be achieved. Some are directly measurable (eg UFC research rating), some are aspirations, hopes or fears.

Stakeholders

These are: students; staff (academic and others); state; industry/business/public organisations; professions; university.

Current Aims were derived from the Mission and the CSFs and are as follows:

> To achieve a University Funding Council (UFC) research rating of 5 in 1993. To improve the management processes in the external world by research, teaching and advisory work.
>
> To be the 'number one' UK business school, in terms of the services and products offered to targeted markets.
>
> Be a total quality business school which fully involves and develops all employees and revolves around never-ending improvement of processes to meet customers' requirements completely.
>
> To empower employees and teams to act in making continuous improvements.

The Quality Council also identified 28 critical processes. These are the activities which must be carried out especially well in order for the CSFs to be achieved. The Council then produced a 'process quality matrix' in order to prioritise critical processes for improvement. This identifies which processes have a high impact on each CSF. Again the necessary and sufficiency rule applies. The matrix also showed the subjective quality ranking given by the Council to each process on the scale:

A Excellent Performance
B Good Performance
C Fair Performance
D Bad Performance
E Embryonic Processes

A second matrix showed the results of this work - a plot of the quality of each process against the number of CSFs, showing the critical processes in most urgent need of attention.

All 28 processes were grouped under seven headings and these main groupings given generic titles. Seven Process Quality Teams were set up to manage these processes.

PROCESS QUALITY TEAMS (PQTs)

The PQTs own and manage the process improvements.

Purpose

To define certain business processes and to set them up to run perfectly.

Each PQT Chair will form a team of approximately 8 staff. Their responsibilities will include:

- Breaking down and describing the assigned critical processes
- Prioritising and selecting processes for improvement
- Setting up quality action teams (QATs)
- Reviewing and supporting QAT activity.

QUALITY ACTION TEAMS (QATs)

The actual detailed improvements will be carried out by QATs.

Purpose

To define and improve any particular process assigned by a PQT.

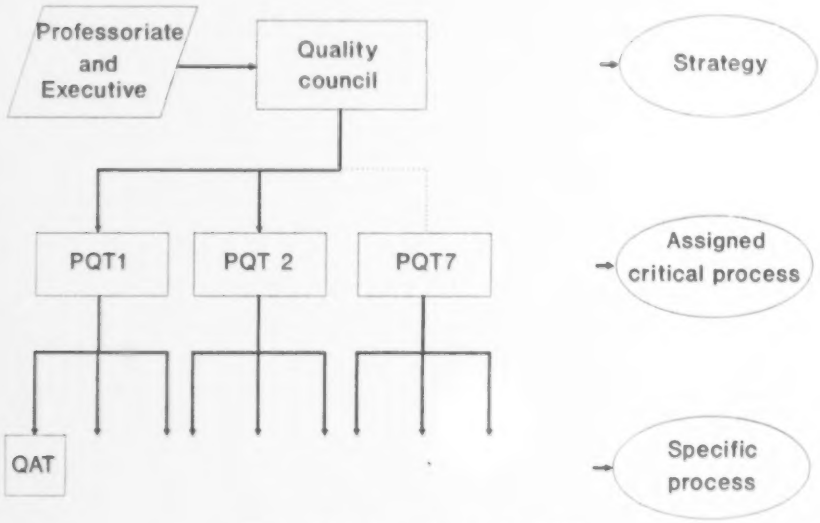

Figure 10.2 *Organisation for TQM*

Composition

6-10 members of staff, selected by a Team Leader, representing all those involved in the assigned process. The team leader will be selected and asked by the PQT to form the team, preferably using a flow chart of the process. It is hoped that every employee at the Management Centre will be involved in quality improvement through a QAT (or PQT) at some point. Their responsibilities will include:

- Drawing a flow chart of the process to identify its customers and suppliers
- Identifying measurement points
- Measuring and comparing results with requirements
- Improving the process and documenting it

This teamwork structure, which is shown in Figure 10.2, should ensure the widest possible involvement in the TQM process and its effective implementation.

INTRODUCTION AND TRAINING

Everyone took part in a one day workshop to explain what had been done by the Council and the plans described above. There were several workshops to accommodate all staff, led by the Professor of TQM.

Further training, on process improvement methods, will be provided to the individual teams on an "as needed" basis. It was expected, however, that academic staff at a management centre should be familiar with techniques such as flow charting, force-field analysis, Pareto analysis, brainstorming, cause and effect analysis, and the use of simple data presentation methods.

The Quality Council prepared a very brief force-field diagram of the pressures for and against TQM at the Management Centre (Figure 10.3).

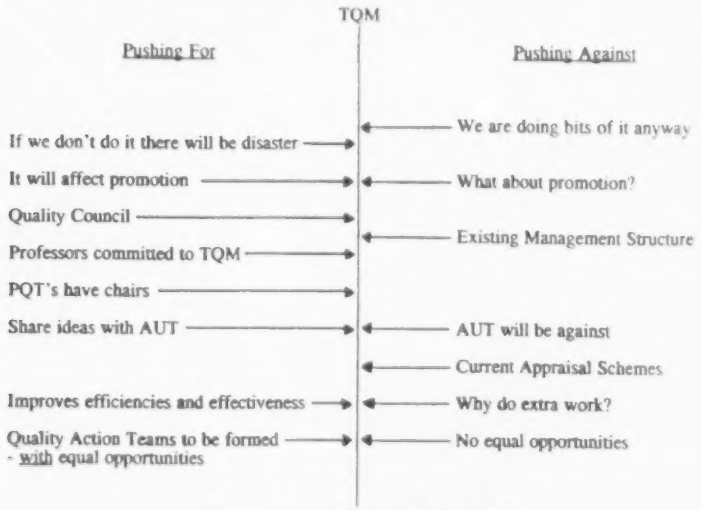
TQM
Pushing For
Pushing Against
If we don't do it there will be disaster
We are doing bits of it anyway
It will affect promotion
What about promotion?
Quality Council
Existing Management Structure
Professors committed to TQM
PQT's have chairs
Share ideas with AUT
AUT will be against
Current Appraisal Schemes
Improves efficiencies and effectiveness
Why do extra work?
Quality Action Teams to be formed - with equal opportunities
No equal opportunities

Figure 10.3 *Force field analysis*

It was agreed at the senior level that only by measurement would people know when the Centre had succeeded in its Mission and in meeting its aims. To measure the start point, a survey of the staff's perceptions of quality at the Management Centre was carried out. The survey addressed all the key areas of the Bradford TQM model. Many positive things showed in this survey, eg people taking pride in the Management Centre, but the survey also highlighted many areas for improvement. Deficiencies in teamwork, communication, systems and measurement were identified. The most alarming statistic was that 88% of the respondents did not feel that the senior staff had established a clear policy and strategy to improve quality. Clearly this illustrated that the ground was fertile for a TQM initiative.

The TQM training programme commenced with a teamwork workshop for the executive committee and the Professoriate - see Figure 10.4.

The senior team profile had previously been exposed to the Myers-Briggs Type Indicator (MBTI) which is a psychological measure that attempts to explain the central aspects of people's personality, both to the individuals themselves and to their colleagues. An understanding of the MBTI measures helps to promote effective teamwork. This profile was reviewed at the workshop together with the TQM concepts and models. The action plan for implementation of TQM at the Management Centre was also reviewed.

Four TQM workshops have been run to date and 85 members of staff have received the first stage of their TQM training. The objectives of the workshops were:

- to enable staff to share information on their work and associated quality problems,
- to develop staff understanding of the concept of TQM,
- to have fun,
- to start building more effective teamwork for quality improvement.

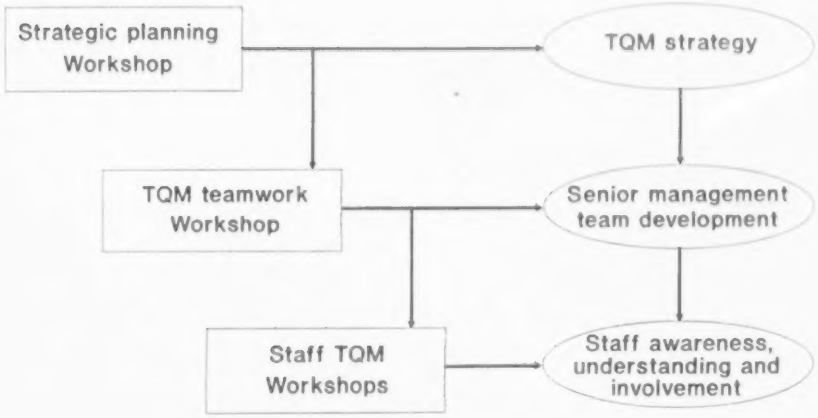

Figure 10.4 *The training programme*

The outcome of these workshops was that staff were encouraged to participate in the TQM process at the individual and team level. A team approach to continuous improvement around the Management Centre's key processes was launched by the Quality Council, once a core of staff had been trained. All staff have been asked to do some work on improvement immediately on an individual basis, using the tools and techniques of TQM learnt on their workshops.

THE WAY AHEAD

The first phase of the TQM programme was concerned with obtaining the commitment of the Professoriate and executive committee to the principles of TQM. This commitment to TQM has been reinforced by the following statement from the Director of Bradford Management Centre, Professor David Weir:

> "We are entering a very challenging competitive phase in the life of the Centre, and we are committed to creating a quality environment. Our success over the next few years depends on our ability to liberate the enormous positive energy within the Centre to meet our customers' requirements. Universities, old and new, all over the UK, Europe and the World, will have to adopt never-ending quality improvement processes to succeed. We want to be one of the first Departments to use TQM to gain a clear competitive advantage over our competitors."

A strategy for implementing TQM was developed at a strategic planning workshop. A teambuilding workshop was used to weld the Professoriate and executive committee into an effective senior management team. A Quality Council has been formed to guide the programme. The commitment to TQM was communicated to all the Management Centre's staff through a series of TQM workshops. The development of a TQM culture has started to evolve through the training programme - see Figure 10.4.

How will the necessary improvements be effected in these areas? Some of the harder tools and techniques of TQM will undoubtedly be called into play. The role of quality management systems such as ISO 9000 can make a significant contribution to improvement. The review of existing formal and informal procedures and the adoption of best practices is a fundamental step in the TQM process. It is important to produce a documented system of what is actually done. The danger in all improvement activities is that people prefer to improve processes first before writing down what is done. This results in an indisciplined approach and progress is usually not sustained. Measurement and recording systems required by a good quality system will also result in more effective operations. Many organisations in the educational sector are considering the contribution of ISO 9000 to quality improvement. The role of teamwork and the tools of TQM will also make a major contribution to the programme.

The combined effects of good systems and people working in teams using the tools and techniques of TQM sustain the process of continuous improvement. The process quality teams and quality action teams will be empowered to drive the improvement process forward.

Initiating and sustaining a TQM programme in a large and well established academic institution raises many interesting questions. Hopefully, the TQM initiative at Bradford is fully integrated into the Management Centre's operating philosophy and management systems. The TQM awareness level of all staff has been developed by a systematic training programme. As the programme evolves, further development of the quality model may be required. The contribution to quality improvement of the various elements of the European Quality Model will be evaluated. The ultimate success of the programme

will depend upon people working effectively together, with the shared values of TQM, to achieve the shared aims critical to the future of the Bradford Management Centre.

The TQM work will now be extended to the main University and work has started on workshops for the Vice Chancellor, Registrar, Pro-Vice Chancellors, Deans, and Heads of Departments.

11 Strategic quality management: if I pull it up the flagpole will anyone salute?

Robert James Newton, *Greater Peterborough Training and Enterprise Council (GPtec), Peterborough, UK*

INTRODUCTION

In recent years there has been a proliferation of articles on organisational development, very few of which have drawn the essential links between quality, strategy and policy which this paper addresses. As any reader of Business Week would know some of the highly proclaimed, quality conscious companies identified by Tom Peters and colleagues in 1983 have since experienced major problems. As Tregoe and Zimmerman (1989) have so accurately proclaimed, the problems "did not stem from operational inadequacies but from strategic deficiencies. These companies failed because their vision of quality was flawed".

To avoid this strategic trap, into which I expect many more British companies to fall, this paper advocates the understanding and use of the technique commonly referred to as Strategic Quality Management (SQM). Nowhere is the use of SQM more appropriate than in the Training and Enterprise Councils (TECs) who are not only in the constant eye of their local communities but are under the rigorous scrutiny of various government agencies. Furthermore in preaching the significance and importance of quality assurance to local businesses each TEC must be seen to be practising it within its own organisation.

Like Tregoe and Zimmerman, I do not wish to criticise the prevailing wisdom regarding operational excellence and the use of various quality operational systems to bring this about, but to emphasise that the last thing a company headed in the wrong direction needs is to get there more efficiently. This paper therefore addresses an apparent imbalance in the literature in respect of quality debate about how organizations, like those of the Training and Enterprise Councils, can improve company performance through the project management triad of strategy, policy and quality.

STRATEGY

As Stephen Connock (1991) has pointed out, Strategic planning processes have increased in importance in organisations in recent years, so too has the meaningfulness of strategic notions such as vision and mission. Very rarely, however, does an organisation take pains to explain its vision of quality and how such a vision determines the interrelationships of strategy and policy. The particularly interesting thread of values which weaves its way through this project management triad is ignored in this paper, not for its lack of priority in quality debate, but because its significance in organisational development is paramount and is deserving of a paper in its own right.

For Training and Enterprise Councils, the very effective trap which they must avoid at all costs is to allow the obvious intensity of operational pressure to overwhelm their strategic vision. In order to preserve the long term, strategic well-being of an organisation, Training and Enterprise Councils must go beyond the quarter by quarter operational outlook.

For Greater Peterborough Training and Enterprise Council (GPtec), strategy is the description of what the organisation is responsible for delivering and how we intend to determine priorities in the light of available resources and conflicting commitments. The vision of quality shared (in value terms) by the senior management group of GPtec is that

it is a strategic business management function which will help us, and other companies with whom we work closely, to change our cultures. In this respect, our SQM programme began with the senior management team taking responsibility for laying down objectives in the form of policy and strategy.

The central thrust of GPtec's approach to implementing our total quality policy is, therefore unequivocally, a strategic one. Continued success of our operation depends as much on the quality of our strategic thinking and on how well this thinking becomes imprinted on every decision made within the TEC, as it does on the effectiveness of our internal day to day operations. At the risk of using definition as explanation, for GPtec SQM is the process by which we can translate our very clear vision into action. Or put differently, by the use of SQM techniques we are able to take the strategic direction formulated by the senior management group and translate this direction into a quality operation.

In committing ourselves to quality the usually hidden relationship between strategy and structure becomes manifest - structure follows strategy. Thus, the quality of strategic decisions must be management's first priority in bringing about effective organisational structural change. In putting quality of strategy above all other management processes, GPtec has shifted away from a dominant Civil Service culture of cell-based operation to a team-driven culture commensurate with the much more business-like framework of the TEC marketplace. In the development of our SQM organisational culture we have shifted from a hierarchy based on status towards one based on service, explicitly recognising the notion of both internal and external customer satisfaction.

IMPLEMENTING SQM

The major lesson within the domain of quality, and in particular the SQM context, is that organisational restructuring is an integral part of the strategic management process and cannot and should not be divorced from it if quality - defined simply as meeting customer requirements, - is to be an overarching strategic aim.

As Miller and Innis (1990) have so lucidly put it, "There is little point in having a well worked out strategy which commits the service ... to the improvement of quality if this message is not thoroughly understood throughout the whole organisation" (p 34). As the senior management group of GPtec therefore, our first essential task was to raise the awareness of all our staff about the concept of SQM and how we firmly believed that quality improvements continually derive through staff's commitment to it. To this extent our guiding principle in achieving this outcome was to recognise that, "In involving people in the debate on quality and on strategy, it is therefore important to specify precisely the nature of the issues, the assumptions behind the approach and type of response expected from the people being communicated to?" (ibid p 36). For this reason we chose the communication process of open forum debate.

To contextualise the debate and to give the feeling to staff that the meeting was but the start of an explicit use of SQM principles we devised a company SQM project called 'MORALE'. To foster understanding that the senior management group were fully committed to this SQM project and to convey our desire for far more than lip service to be paid to it, the implications were explained in detail to all staff.

The starting point for the presentation was that ownership and genuine empowerment of staff is, in essence, the major focus of a strategic quality management approach. However, for this to be not only said but implemented it was pointed out how a SQM stance to organisational development suggested the use of what we now call a quality project management system. It is a firm belief of the senior management group of GPtec

that such a quality system necessitates the use of modern management techniques and information technology as major ways of preventing poor performance and assuring quality of service to all our customers, whether they be internal or external. Furthermore, this project management structure will avoid the decision taken by so many other companies, often by default, to maintain an imbalance of executive time and effort spent between finance and strategy.

The essential purposes of the company Morale project are: to involve all staff in the strategic challenge facing all TEC's; to commit staff to the view that short term gains are no substitute, in quality terms, for long term security and getting the TEC firmly established; to inform staff of strategic decisions made by the senior management group only after which such a company project can begin; that the largest failure cost of all occurs when bad quality strategic decisions are made.

Strategic quality management conforms to the precept that the real objective of any quality assurance project is to get decisions made correctly by all the project team members involved. The Morale project is GPtec's attempt to implement a quality assurance programme which runs on the twin engines of strategy and policy at action and decision making levels, involving all staff. Hopefully, as is the intent behind the project, we will avoid the sorts of quality problems which beset most organisations namely; lack of top management support, lack of training, lack of discipline, lack of resources and lack of time.

The introduction of a project management system as a team managed operational mechanism, permits the full involvement of all staff with clear understanding that quality of performance is measured against team determined project objectives which must be strategically aligned to GPtec's corporate and business plans. Quality of operation cannot be gauged without reference to strategy and policy - the driving forces of service delivery.

The significant involvement of each and every member of staff in a project area team with joint responsibility for writing performance objectives and establishing quality standards gives the greatest possible sense of ownership that staff can feel. Taking this one step further and allowing teams to set targets based on an analysis of GPtec's annual business plan, should also help in improving strategic decision making at operation team level.

The essential staff training and development profile, that so depicts any quality organisation, will emerge from the strategic base of this SQM project system and hopefully result in the growth of individuals as well as in the growth of the TEC itself. Future decision making by senior TEC management may thus be influenced in respect of strategic plan development. Decision making is a process that is dependent upon the quality of the input as much as the quality of the process itself.

By the use of management auditing it should be possible to measure the effectiveness of this SQM project - and evaluating vision and mission is a rare phenomenon in British enterprise today. Pursuing a SQM approach to translating vision into action is about articulating the long-term human resource goals, core values, key behaviour and underlying philosophy which derive from, support and complement the business mission and strategies of GPtec.

CONCLUSION

This paper suggests that greater weight of emphasis should be given to quality discussion at a strategic level. When quality, policy and strategy are brought together in a company management model, operational quality flows from it. The quality philosophy

underpining GPtec's SQM model is to practice what we preach. Our quality tenet is: if it doesn't add value its a waste of time. Our quality slogan is: if it is not in the strategy we don't do it.

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12 Profits and pitfalls in establishing a qualytechnic

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INTRODUCTION

The University, like other academic institutions, has a sophisticated quality assurance system for its academic provision. Many of the supporting functions - personnel, finance, etc - had been provided, at least in terms of policy and structure, by the local authority. Incorporation of the Polytechnic as a higher education corporation required the institution to take over and develop many of these services. Initially, attention was focused on simple operational provision - we needed administrative, personnel and financial systems in place and the timescale to provide them was very short. The move to encompass such systems within a quality framework simply resulted from :

- a recognition that the total experience of students was significantly influenced by such systems - in some cases (such as catering) almost as much as it is by the academic provision
- dissatisfaction with the nature and level of service provision - arising, in part, from the haste with which they were, of necessity, introduced
- a critical mass of staff who were aware of the wider quality revolution taking place within industry and commerce.

The Assistant Director of the University who has responsibility for academic quality called together a number of people who he knew had an interest in, or experience of, quality matters. He established a quality steering group to evaluate various approaches to quality assurance and to attempt to identify a direction for the university to improve the quality of its non-academic services. This group included the deputy chair of the board of governors, who had recently undertaken an exercise within his own (manufacturing) company to apply for and receive BS5750 accreditation. The main debate centred on the difference between procedurally-based approaches (such as BS5750) and culturally-based approaches such as Total Quality Management (TQM).

At the time, there was no clear drive for quality improvement coming from the senior management of the institution and it was felt that TQM, in particular, could only be successful if such a drive existed. Additionally, the steering group was concerned about the nature and pace of change that the staff of the university had already been subjected to over the previous two or three years.

Accordingly, it was felt that a procedurally-based approach would :

- allow quality issues to be raised and discussed in a relatively 'hard-edged' manner, without the need for cultural change or significant resource input
- form the basis for education of the university management and for later consideration of cultural change to initiate a more broadly-based quality movement
- assist in the process of service definition for many of the still relatively new systems and procedures.

The concept of a university-wide initiative was sold to the senior management team through a series of informal meetings of the more senior members of the steering group with the senior university managers and culminated in a seminar for the entire senior management team of the university. Even after this process, it is fair to say that there were reservations amongst some members of the management team about the relevance of industry-based quality approaches to a higher education institution.

It became obvious that certain areas of operation were suitable for immediate application of a procedurally-based approach. But, allowing for the fact that most of those within the institution that had knowledge or experience of quality matters had jobs that would allow little time for direct involvement, resources were needed to prioritise and co-ordinate work in different areas.

Short course provision was identified as an area in which some form of quality accreditation would have immediate marketing benefits and a bid was made to the PICKUP agency for funding to support the establishment of BS5750 accreditation for the short course provision. The success of the bid resulted in the appointment of a quality development manager whose brief was to examine the short course area and to make recommendations which may result in eventual BS5750 accreditation. Since many of the supporting activities of short courses are also supporting activities of other parts of university provision, this actually resulted in a wider consideration of quality generally. The Quality Development Manager is thus involved in a number of specific projects within the university initiative.

This may sound straightforward. However, the nature of the debate on quality within the university meant that there was a some confusion amongst many people (including senior managers) about the nature of quality systems and about BS5750 in particular. There was certainly resistance in some quarters to the idea that existing systems and procedures could be described as quality systems or procedures and a commonly held view that any accreditation system must be bureaucratic and cumbersome.

The real brief of the quality development manager was therefore to begin the process of education and of attitude change that would result in positive work towards quality improvement, and then to act as driver for the short course accreditation project and as facilitator for other projects. This is best considered in three main phases.

PHASE ONE

The process began with data gathering around the institution, interviewing key managers and a cross-section of staff to gain a greater understanding of their attitude towards quality. This sensing and networking was also useful in gaining access to areas for future work. Taking into account the size of the organisation, a realistic plan was put together of what could be achieved with estimated timescales - see figure 12.1.

Pitfalls

- Pace and diversity needed to be controlled
- Wider quality debate concerned with the applicability of BS5750 to education
- No quick results likely
- Funding and budgets

Profits

- A genuine concern for quality was evident
- Lecturing staff are very conscious of the need for quality
- Enthusiasm to see improvements

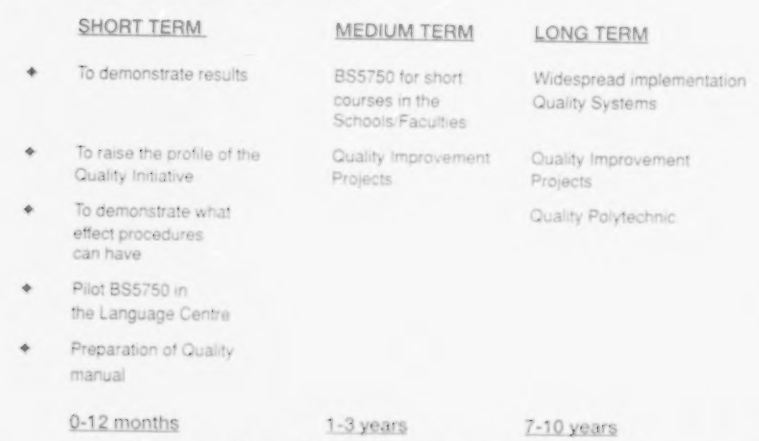

Figure 12.1 *Aims and approach*

PHASE TWO

Most of the short course co-ordinators were interviewed to gain an understanding of the current operations and to determine which area would be appropriate for a pilot study. After careful consideration, the Language Centre was chosen as the pilot area. This satisfied the criteria of being containable and had a good chance of success due to the existing systems and enthusiastic management.

At this time it was also considered whether it would be beneficial to use consultants. It was felt that this would increase the likelihood of success due to their experience of applying the standard within an educational context.

Pitfalls

- Cost of consultants
- Diversity of approaches for short course provision
- Pressure to increase short courses to generate income
- Limited incentives for staff to run short courses
- Concerns that BS5750 was too bureaucratic or would impose a system.

Profits

- Increased chance of success by using consultants
- Increased chance of success by selecting the pilot area wisely
- Enthusiastic management in the pilot area

PHASE THREE

This phase included application of the standard to tailored language courses and involvement in ongoing quality projects within central services, eg finance, reception and personnel.

The approach taken for the pilot was to assess current practices in the light of the requirements of the standard and produce an audit report. All Language Centre staff were involved in the results of the report and the proposed approach.

Drafting of procedures was then begun with substantial involvement from the Language Consultant who manages the Language Centre. Once implemented, practices were to be audited against the procedures and modified.

Pitfalls

- Applying the standard to education
- Labour intensive
- Controlling the pace of all the quality projects whilst providing the support required.

Profits

- Accepted practices are questioned and improved
- Staff became more involved in making systems more effective
- Transfer of learning for future application of the standard
- Budget was allocated for the quality initiative

PRESENTATION TO MANAGEMENT

To serve as a progress report and to encourage ownership which would be essential for assessment purposes, a presentation was given to management on the requirements of BS5750 and progress made. This presentation served to not only achieve the above aims, but also to encourage a debate around the direction of the quality initiative and the need to address cultural issues.

CONCLUSION

The strategy adopted to establish a Qualytechnic at Leeds has been successful to date. The aim was to begin with a systems approach which would lead to a greater commitment to quality. This has been demonstrated following the presentation to senior management. The systems approach has also benefited the Language Centre by questioning and improving current practices. These lessons can now be transferred to other short course providers.

13 Student satisfaction and perceptions of quality

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INTRODUCTION

The purpose of this brief paper is twofold. First, to provide a context in which to view the emerging importance of student-based information. Second, to briefly describe some recent research which illustrates how student-based information may be gathered and interpreted to reveal patterns of student satisfaction. These trends are valuable inputs to managerial decision-making and may be used to inform innovations in quality policy.

PERCEPTIONS AND EXPECTATIONS OF QUALITY

The quality debate in higher education traditionally focuses on whether profit-orientated private sector concepts can be readily transferred to the public sector. This is a complex issue but even the limited view of the student, as a customer or client, goes against the grain of many in HE. They are very reluctant to empower a group who are traditionally treated as passive recipients of education.

Both the broad consumer perspective, that service quality can be equated to the extent to which the perceived level of service delivered matches consumer expectations (eg. Lewis and Booms 1983) and the more specific view that service satisfaction equals consumer perception minus consumer expectation, is not without problems in the HE context. However, the implication that satisfaction will result if perceptions are greater than expectations has a great deal of intuitive appeal.

This balance between consumers' perceptions and expectations as a measure of service quality has been fairly widely-discussed (eg. Churchill and Suprenant 1982; McMillan 1986; Parasuraman et al 1986) and appears to be useful. Nevertheless antagonists to the quality initiative often argue that in the HE context it is futile to attempt to define quality in this way because student expectations are poorly developed, variable and unpredictable. Validly measuring student perceptions and expectations is not a simple matter but can be approached in a systematic way to reveal useful information.

To complicate matters further, antagonists to the quality initiative often point out that different stakeholders in HE (ie. students, teachers, managers and employers) will all have different sorts of expectations from a particular institution or service. Consequently they claim that different stakeholders will have disparate ideas about "quality" jeopardising any attempt at valid assessment. Clearly there is more than one client group to be considered in examining the perceived value of higher education, but this does not mean that these various perceptions cannot be systematically studied.

Despite these conceptual caveats, two things are clear. First, the most important client group are the "front-line" consumers, the students themselves. Second, and equally important, it is evident that "quality" (however defined) will become the principal means by which higher education institutions will attempt to differentiate themselves from their educational competitors.

THE WORK OF THE SSRU

Until recently, students' views of their academic experience had been of interest only to a handful of educational evaluators but increasingly the value of this information has been recognised. The realisation that students' attitudes and perceptions are not only interesting but may play a central role in shaping the decisions of those who manage our higher education institutions has widespread implications.

Since its inception in 1988, the Student Satisfaction Research Unit (SSRU) at Birmingham Polytechnic has produced an abundance of information related to student perceptions of educational quality and their satisfaction with their educational experience. Our interest in quality and our attempts to measure it through student satisfaction have three broad aims. First, we are attempting to identify and examine the components of satisfaction and the components of quality and to consider how these two domains are interrelated. Second, we are investigating whether there is a common core to students' perceptions of satisfaction and quality. Third, we are attempting to model student satisfaction and quality of education and to represent this model in ways which are designed to inform management decision and policy-making.

Nowadays, collecting information about student satisfaction in educational establishments is a growth industry. Information of this kind has the potential benefit of guiding management decision-making with respect to the planning and provision of educational services. Those HE managers who can clearly identify and subsequently measure client-centred quality will be able to capitalise on student-based information to support their claims for resources.

Eliciting Areas of Student Concern

One approach to directly eliciting students' views of the Polytechnic which has proved to be particularly productive over the last few years is a form of Nominal Group Technique which we have dubbed the "Group Feedback Strategy" (GFS). Essentially, this takes the form of a structured participative discussion with groups of students in order to provoke a span of student-nominated indicators of satisfaction and dissatisfaction.

Experience has shown that engendering an atmosphere of frank and open communication encourages students to talk freely and honestly about what their education means to them. These sessions, facilitated by experienced group leaders, generally result in eliciting a wide and diverse range of satisfiers and dissatisfiers which are used on an annual basis to update the design of the instruments used to survey student satisfaction in the Polytechnic. The GFS exercise is used primarily as a device to validate the content of the questionnaire survey prior to it's annual administration, although the procedure itself produces some interesting findings. Some results of the GFS session are described in the next section.

Three factors were used to define the sample frame;

a Faculty - 8 categories in all (Health and Social Sciences, Built environment etc.)
b PFC Classification - 3 categories (Postgraduate, Degree and Other)
c Mode of Attendance - 3 categories (Full-time, Part-time and Sandwich).

16 classes were representatively sampled from this frame and participated in GFS exercises, enabling the views of 265 students to be obtained.

It is worth noting that the overwhelming majority of students welcomed the opportunity to express their opinions in a confidential climate and were delighted to have some input into any future decision-making process.

Areas of Student Satisfaction and Dissatisfaction

The outcomes of the GFS procedure were consensus, but wide-ranging, lists of satisfiers and dissatisfiers elicited from students in each of the 16 participating classes. In order to provide a framework for analysing these unstructured statements, each "good" or "bad" statement was allocated to one or more of 44 core activities which had been identified through synthesising categories used in our previous work. These core activities are reasonably exhaustive of students' concerns and are clearly associated with student satisfaction and dissatisfaction. The 44 core activities themselves represent four broad areas of student concern. The four broad areas are shown in Table 13.1 together with a mean percentage satisfaction score for each area (derived from the relative proportion of good and bad statements allocated to each area).

1 Teaching/Learning Activity Area	36.9%
2 Personal/Interpersonal Activity Area	76.5%
3 Using Facilities Activity Area	17.6%
4 Spending/Budgeting Activity Area	4.6%

Table 13.1 *Areas of student concern*

These results are interesting because they suggest that students have a natural tendency to regard some aspects of their educational experience as innately and potentially more satisfying than others. The Personal and Interpersonal area which includes such activities as "broadening my experience and outlook", "socialising with other students" and "talking to staff freely and openly" is seen in a very positive light (77%) whereas Spending and Budgeting has little potential for satisfaction (5%). Teaching and Learning Activities can provide some satisfaction (37%) whereas Using Facilities generally tends to be a focus for discontent (18%). In other words, students tend to stress negative aspects or grievances when considering their finances or using polytechnic facilities. In contrast, students are inclined to be more positive when considering their study experiences and even more enthusiastic when reflecting on their personal and interpersonal experiences.

Ratings of Importance

In addition to expressing their opinions about their likes and dislikes, students were also required to rate each of the 44 core activities with respect to two aspects of importance. The first rating was of the importance of each activity to enhancing the effectiveness of study; the second rating was of the importance of each activity to enhancing students' personal sense of well-being. Part of our purpose was to investigate the relationship between these twin aspects of importance in order to provide information about students' priorities.

The results revealed that students see some activities as consistently more important than others. Some activities were seen as critical to both study effectiveness and personal well-being. Some other activities were perceived as relatively unimportant in both domains; yet others were seen as differentially important to effectiveness of study or well-being. The two ratings of importance appeared to be tapping different underlying student perceptions. Table 13.2 below shows the five most and the five least important activities together with their associated correlations between ratings of importance to effective study and importance to personal well-being.

Most Important Activities for Effective Study	**Rank**	**r**
Understanding the content of lectures	1	0.30
Receiving well organised and structured tuition	2	0.24
Receiving feedback on assessed work	3	0.40
Receiving guidance and supervision by staff	4	0.41
Using time productively	5	0.45
Most Important Activities for Enhancing Well-Being		
Paying my way/spending/budgeting	1	0.69
Increasing my self confidence	2	0.67
Having a base to leave personal property	3	0.59
Receiving well organised and structured tuition	4	0.24
Receiving feedback on assessed work	5=	0.60
Broadening my experience and outlook	5=	0.40
Least Important Activities for Effective Study		
Joining societies and groups	1	0.66
Using the accommodation service	2	0.77
Using student services (e.g. medical etc)	3	0.80
Using canteen facilities	4	0.59
Buying acceptable (cost, range & quality) food...	5	0.60
Least Important Activities for Enhancing Well-Being		
Using the accommodation service	1	0.77
Joining societies and groups	2	0.66
Accessing relevant information from Faculty learning Centres	3=	0.64
Using student services (e.g. medical etc)	3=	0.80
Using Faculty Learning Centres	5=	0.65
Accessing relevant information from IT facilities	5=	0.66

Table 13.2 *Most important and least important activities*

Mapping Satisfaction and Importance Ratings

Both satisfaction and importance are essential ways of considering students' perceptions of their educational activities. Polcyn (1986) has suggested that importance and satisfaction can be represented as quadrants on a graph and each quadrant has different organisational implications. Figure 13.1 shows the four key areas of student concern mapped onto an importance/satisfaction graph.

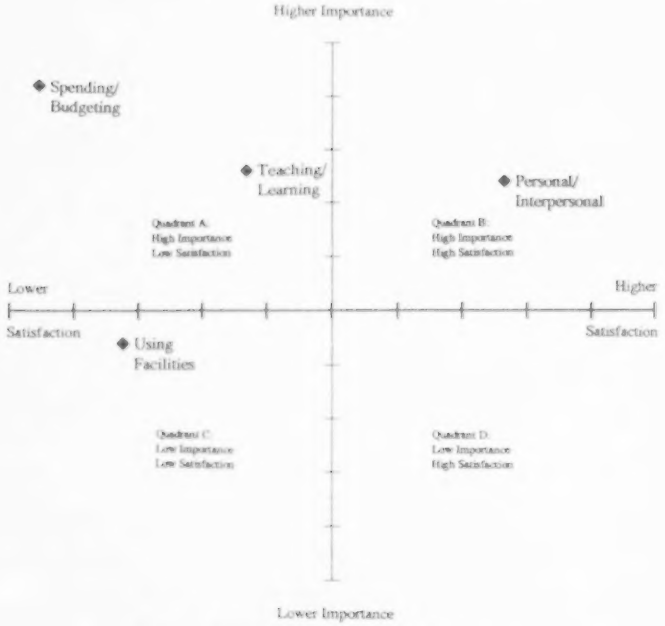

Figure 13.1 *Importance - satisfaction map*

The graph shows that both the Spending/Budgeting Area and the Teaching/Learning Area fall within Quadrant A (ie. High importance and low satisfaction). Consequently, both areas may be regarded as those where management may consider intervention a priority. Spending and budgeting is an area of increasing concern to students at Polytechnics and this is reflected in its position on the graph. Personal and Interpersonal Concerns fall within Quadrant B (high importance and high satisfaction) on the graph and this reflects students repeatedly-voiced opinion that being able to approach teaching staff and relate to them in a free and open manner is of great importance to their general levels of satisfaction. From the management perspective, the graph shows that it is necessary to maintain course organisation so that opportunities for good quality interaction between staff and students are optimised. Using Facilities can be seen to be the least important of the four broad areas and it can be seen to fall in Quadrant C (low importance and low satisfaction). Often it seems that good student facilities are weighted as more critical by management than they are by students themselves. The graph shows that no area falls within Quadrant D (low importance and high satisfaction) and this is probably an outcome of the GFS procedure itself which is designed to target issues of high importance rather than focus on issues of little or no impo..ance.

CONCLUSIONS

These days, cost and quality are two fundamental concerns in the quest for greater accountability in higher education and this has heralded public sector consumerism as an

increasingly compelling force for change. As Pollitt (1988) has pointed out, the consumer approach can appear in many different guises. At its weakest it can range from being a visible but harmless cosmetic. Alternatively, it may manifest itself as a means of providing information to consumers or managers. It may even consist of real attempts to empower service users or inform HE managers. In the context of higher education, this new public orientation is particularly significant in stressing the importance of obtaining the opinions of stakeholders in the process. User feedback on quality of educational services is increasingly acknowledged as critical in understanding what quality means, although much work remains in developing appropriate methodologies and techniques to measure and use this feedback to maximum effect.

One of the dangers in attempting to improve quality through students' views is that expectations about change may become elevated to unattainable levels. If resource constraints mean that managers are unable to respond to students suggestions for improvements, then skepticism and distrust are likely to become additional stumbling-blocks to change. It is our view that these dangers can be minimised if clear and practical methodologies and models are derived which link student satisfaction information, performance indicators, and management decision-making.

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14 Experiences in the design and conduct of enterprise audits

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INTRODUCTION

In determining an audit methodology to be employed there are a number of questions which have to be considered, questions such as:

Is it to be "top down" directed by management or "bottom up" directed by the staff involved (ie who "owns" the audit)?

What is its purpose? Is it to attract funding support or identify a present position or raise EHE awareness or identify those courses or groups of staff in need of enterprise development?

To what extent is it to be quantitative (allowing comparisons) or qualitative (allowing insights) in nature?

Is it to be course driven (via course committees) or subject driven (via subject specialist groups)?

The audit undertaken at Glasgow Polytechnic, which was a pre-cursor to our main five year EHE project, tended towards a top down model in that its approach and methodology was directed by a management steering group. It was largely subject driven through subject specialist groups. It was essentially qualitative in nature, although a decision was made during the study to use a quantitative approach in questionnaires to course organisers. It was concerned with awareness raising and position identification. It commenced in mid session, late January 91, and concluded in November 91.

No attempt was made by the audit team to define enterprise in the form of some verbal statement. However, the steering group's view of enterprise was about giving students greater responsibility for their own learning; about developing their transferable personal skills; and, through these, enhancing the students' economic and social worth.

The audit involved three major activities:

- A series of structured interviews, concerning current teaching and assessment methods, with subject area staff to examine ways in which opportunities were given for students to exercise responsibility for their own learning and develop core transferable personal skills.
- A series of structured interviews on the placement experiences of a sample of students (and their supervisors) to attempt to identify the characteristics of an "enterprising" placement.
- The completion of a questionnaire by course organisers of degree courses, with follow-up interviews, on the teaching and assessment of core transferable personal skills. (These core transferable personal skills were identified as basic IT keyboarding skills; study/learning skills; and communication skills.)

From the conduct of this audit six main issues were identified in its evaluation:

- The consequence of the use of the term "audit" and ownership of the audit.
- Time and timing of the audit.
- The role of the audit in raising EHE awareness.
- The choice and role of the audit team.

- Qualitative v quantitative approach.
- Course driven v subject driven approach.

USE OF THE TERM "AUDIT" AND OWNERSHIP OF THE AUDIT

The approach adopted was very much a top down approach directed by management as opposed to a bottom up approach "owned" and directed by the staff involved. Essentially management wished to identify where we were, in terms of the penetration of enterprise development in the curriculum, and to identify examples of good practice. The audit team planned and implemented an audit strategy with no prior consultation with course teams or subject areas.

At the outset we found considerable concern in the minds of subject area colleagues about the audit and a certain element of suspicion. This resulted in an over cautious approach being adopted by some subject areas. For example the view was expressed on a number of occasions, that subject areas would have to be careful how much they disclosed lest they be considered as "enterprising enough" and lose out on any future funding. This caution regarding disclosure took a little time to overcome and, to assist, we wished to be as flexible as possible in terms of how we interfaced with subject area representatives in order to gain maximum co-operation.

Consequently, whilst the agenda for the structured interview remained the same, the actual procedures adopted, from one department to another, differed quite widely. This resulted in some departments resolving to appoint coordinators with whom we interfaced, and others writing their own departmental reports in order to assist the audit team. Whilst this was welcomed and did have many advantages - it passed ownership of the audit to departments - it did create some problems for the audit team in terms of controlling the audit. In particular, it became impossible to keep this part of the audit running to its pre planned completion time and there was an over-run on this aspect of the study.

We believe such a top down approach can be criticised. It does, for example, perceive the audit as an event rather than as an ongoing reflective review process; that is one which could allow, in the right organisational culture, a commitment to action research through team building and the development of a shared vision by staff about where the Polytechnic wishes to move. Pennington (1991) encapsulates the problem well: "Audits tend to be done by experts to others: by contrast review is something everyone is capable of undertaking". Essentially it has to do with working with people, not working on people.

Those holding this viewpoint would argue that if an institution seeks meaningful change in its practices (in this case enterprise development in the curriculum), then such a bottom up approach is desirable allowing course teams a feeling of confidence and competence to undertake an audit themselves and letting them determine, on the basis of a set of shared understandings, how best to manage this audit.

Given our experiences of undertaking the audit, particularly our experiences of working with those departments who by volunteering to write reports for us took "ownership" of the audit, we are sympathetic to this view. Letting subject teams determine, on the basis of their shared set of understandings, how best to manage the audit seems the way to create a climate for meaningful change. There are, of course, very clear costs associated with such a process. It is developmental, can be lengthy and even indeterminate in terms of its outcomes and therefore can be difficult to control in the project management sense. But the arguments for this approach lie in the very fact that it is developmental and, as

Pennington states, "its momentum is sustained by the improvements staff themselves identify as necessary".

We have been able to determine where we are in terms of enterprise development in the curricula. Whether the audit, conducted the way it was, achieved that momentum towards team building, meaningful change and a shared vision about where the Polytechnic wished to move is an open question.

TIME AND TIMING OF THE AUDIT

The audit was planned to commence in late January. In three respects the audit seriously over-ran its initial planned time. The first was agreeing the methods to be employed. It took longer than planned for the management steering group to agree its preferred strategy. The second was the study via subject area groups due to the methods adopted. The third was in the time required for the data analysis, given the loosely structured interviews approach adopted during our study with subject groups.

Bell (1991) reports that in the Hatfield Polytechnic audit one full session was allowed. Our original timescales were far too optimistic for the qualitative route we took and the commencement of the audit, in late January and straddling the summer leave period, was ill-timed.

We believe audits should commence at the beginning, or close to the beginning, of an academic session and that a realistic period of time should be allowed for consultation in the planning of the audit by any steering group established for that purpose. The comments by Pennington, on the need for the rate of progress to be "acceptable to those who are responsible for delivery", seem particularly apt.

ROLE OF AUDIT IN RAISING AWARENESS

There was a general lack of awareness within the Polytechnic of the Government's EHE Initiative. This gave the audit team problems. Bell indicated similar problems and suggested that, from his experiences, earlier briefings - both of papers and presentations - would have assisted. This Glasgow audit fell into the same trap. Whilst an attempt at awareness raising was made, through letters from the Vice-Principal and presentations to heads of department, from our experiences we would suggest that this is inadequate. Ewins (1991) indicates that a successful procedure adopted at the Polytechnic of Wales was the holding of one day workshops involving all academic staff in the institution, and a series of workshops to key communicators. We believe this should also have been our approach at the outset. Nevertheless, the audit has played a major part in raising awareness and creating the right kind of climate for the main project. Indeed that may be the audit's single most important outcome.

CHOICE AND ROLE OF AUDIT TEAM

The decision to appoint a full time audit assistant from outwith the body of the academic staff, and without any previous experience of teaching in higher education or in the process of the management of degree level courses, had its advantages and its disadvantages. Its advantages lay in the audit assistant being a new face - every member of staff she met resulted in a new professional relationship and was not influenced by the perceptions of previous encounters between the parties. She was not a permanent member of staff from any one constituency within the Polytechnic and could, therefore, be seen as independent. Bell reports that Hatfield appointed a Senior Fellow who had,

from his previous post, extensive knowledge of the Polytechnic and considerable credibility with staff. On occasions the audit assistant did comment upon her status - both in terms of her lack of "well knownness" within the Polytechnic and the grading of her post - as influencing the priority academic staff perhaps assigned to dealing with her requests for interviews and information returns.

For the audit to be worthwhile it requires to be perceived as an ongoing review process and not as an "event". Whether such a review process needs an external audit team - ie. external to the review groups - depends very much on the perceived role of that team. We would suggest two possible roles exist: the first a facilitating role, the second a reporting role. As facilitators their main task would be to raise awareness via the mechanisms of workshops and the like, and in performing a co-ordinating and communicating role between review groups. In their reporting role their main task would be to draw together information on the activities and outcomes of review groups and to consolidate these into meaningful statements which both the community of review groups, and possibly a wider community beyond that, could consider.

As for personnel, there are clear advantages in having senior personnel well versed in the processes and procedures of the institution to undertake such roles. What is critical, however, is the independence and credibility which these personnel are able to bring with them to these roles.

QUANTITATIVE v QUALITATIVE APPROACH

Bell, has commented on the problems of having a vague definition of enterprise and the consequences this poses in questionnaire design. Earl (1991) also drew attention to the limitations of questionnaires in terms of their ability to elicit qualitative information. In this audit the management steering group was concerned about the well known psychological reaction to questionnaires and that staff should not be discouraged from participating by any complex questionnaire. However Ewins points up some of the real problems in undertaking a less structured survey approach. He found in his audit that: replies did not always address the questions asked, the lack of response did not always indicate that a feature did not exist in the course, responses were not always consistent. This experience has been shared by the Glasgow audit team. We see a problem here. On the one hand we have supported the bottom up, action learning approach espoused by Pennington, yet on the other we have experienced the same problems as Ewins in using structured (or loosely structured) survey methods. Pennington acknowledges that the process he advocates "may appear to be lengthy and overly complex" and certainly the experience of this audit team and Earl would indicate that structured interview methods do require very considerably more time than would at first be imagined. By contrast, we found the use of a questionnaire with course organisers later in the audit very efficient and had little difficulty in working with them towards its completion.

We think we were right not to use questionnaires in the initial stage. However, we did underestimate the problems of control and, subsequently, data analysis when we encouraged departments, or groups of staff within them, to write their own reports. On balance we accept the value of this (ie. transfer of "ownership") and, whilst we conclude that it does impact very significantly on the time required to complete such an activity, it can be justified. On the other hand we think it a mistake to assume that the use of questionnaires will somehow, automatically, "switch off" staff. This was not our experience with course organisers. Perhaps preparation for, and timing of any use of, questionnaires is the key to this issue. We believe, therefore, that there is a place for both quantitative and qualitative approaches in such audits.

COURSE DRIVEN v SUBJECT DRIVEN APPROACH

This audit differed from the others mentioned in this report in that it approached information gathering via subject area boards. We took this approach for two reasons. First, efficiency - data on the teaching of a subject could be collected once from the teaching group, rather than repetitiously through sundry course committees. Second, it was felt that course organisers were unlikely to have the depth of detailed knowledge about the teaching methods on their course to be able to answer the audit team's questions without extensive referrals to subject specialists. Our experiences tend to confirm this latter concern.

Conducting our study via subject areas created a level of "corporate consciousness" amongst subject areas (and departments) about their teaching and assessment methods and encouraged at least some subject groups into positive action. One group, for example, managed to have their departmental report published in a professional journal! On the other hand it left course boards largely untouched by the audit and so it may be that their "corporate consciousness" has suffered as a consequence. This could be to the disadvantage of the main EHE project at Glasgow which is planned to work, essentially, through course boards. On balance we conclude that, given the audit was a pre-cursor to the main project and that we tend towards the philosophy espoused by Pennington (that audit is a process of review and not an event), we would have been better conducting the audit via course boards. It might have better set course boards "rolling" on the kind of process review adopted by Pennington at Teesside. However, whilst something would have been gained, something might also have been lost.

CONCLUSIONS

To summarise from the experiences of this study and others, the following conclusions are drawn:

a The term "audit" is inappropriate: "review" is a more appropriate term to describe such processes.

b Reviews should be conducted "bottom up" (ie. ownership should reside with those directly involved) and not "top down".

c They are useful mechanisms for raising enterprise initiative awareness, but this must be positively planned as part of the audit.

d The role of the audit team should be to facilitate, co-ordinate and communicate between course review groups rather than an investigative role.

e Qualitative (ie structured interview) methods are extremely expensive on human resources and make for difficult analysis but allow ownership of the audit to pass more easily to course review groups than quantitative methods.

f Audits are better conducted via course groups (ie course driven) than subject groups if meaningful change is to be effected.

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15 Monitoring the quality of quality control systems

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INTRODUCTION

"Sed quis custodiet ipsos/Custodes?" - Juvenal

Nearly 2000 years ago, the Roman satirist Juvenal made an extremely profound observation. He pointed out that it was all very well posting guards to look after something, but that the efficacy of such a measure would always be in doubt unless further measures were taken to ensure that the guards did their job properly. In other words, Juvenal asked, "Who will guard the guards themselves?"

Somewhat more recently, the Vice Principal of Aberdeen's Robert Gordon Institute of Technology (RGIT) asked himself a similar question about the quality system that had been set up within RGIT in order to meet the accreditation requirements of the Council for National Academic Awards (CNAA). In 1989, RGIT was accredited by CNAA to validate and review its taught degree courses and was scheduled to be considered for re-accreditation in 1996. The Vice Principal was only too well aware that any College seeking such re-accreditation would be required to demonstrate that its quality system had fully satisfied the standards set by the Institution itself, and that the responsibilities and obligations under CNAA accreditation had been properly met. He therefore proposed to RGIT's Academic council that a "meta-quality-control" system be set up within RGIT to help ensure that this did in fact happen, and to provide the necessary evidence. We describe here how this was done.

RGIT'S QUALITY ASSURANCE AND QUALITY CONTROL SYSTEMS

RGIT is one of Scotland's Central Institutions, having over 4,300 full-time and 1,300 part-time students enrolled on over 80 different degree and other courses ranging from Fine Art to Mechanical Engineering.

Academically, it is divided into four faculties (Design, Health & Food, Management, and Science and Technology), each headed by an assistant principal who acts as Executive Dean. Overall executive responsibility for the academic work of the institute and the quality thereof rests with the vice principal, to whom the four assistant principals report in respect of their faculty-related activities.

In January, 1990 RGIT's Academic Council produced a quality handbook defining the procedures that were to be adopted for the quality assurance and quality control of all Institute courses - a handbook that has since been considered with interest by a number of other HE Institutions.

Quality-assurance procedures within RGIT are based on a rolling programme of formal validation and review events, with all taught courses being subject to rigorous validation when they are first set up. All of RGIT's Schools (academic departments within faculties) and other academic units are subject to periodic reviews and, within this school-based system, the individual courses are also reviewed. RGIT is wholly committed to the principle of external peer review, as developed over the last quarter-century and more

by the CNAA. For this reason, the panels responsible for conducting all such validation and review events include a majority of external members - usually two academics and two practitioners. RGIT is almost unique in that the panels are externally chaired, a policy that the Institute believes adds greatly to the authority and overall credibility of its quality-assurance system. The panel also includes two internal members, normally the dean of the faculty concerned and the chairman of the faculty advisory committee which handles the preliminary internal stages of the quality-assurance procedures.

It is also worth noting at this juncture that RGIT deliberately did not set up an Academic Standards Committee or its equivalent, which again makes it unusual among CNAA-accredited institutions. The Institute's thinking in not so doing was that it wished the concern and the responsibility for quality to be built into every facet of the normal systems of academic management. In other words, quality procedures would be based and owned at the appropriate operational level. This did, of course, mean that there were no "quality police" in RGIT. Rather, each member of the academic community was charged with a self-responsibility to be actively involved in and personally aware of, the issue of quality at all levels of academic activity.

RGIT's annual quality-control procedures, on the other hand, are the responsibility of its internal hierarchy of committees. These range from course panels and school committees at operational level, through the faculty boards, which then report accordingly to Academic Council. The Council has delegated responsibility from the Governing Body for the overall planning, co-ordination, development and supervision of the academic work of the Institute. The Institute's quality-control procedures involve carrying out annual internal critical appraisals of the operation and success of all RGIT courses in meeting their stated aims and objectives.

HOW RGIT'S INTERNAL QUALITY AUDIT TEAM WAS FORMED

In the Spring of 1990, RGIT's Vice Principal submitted a discussion paper to academic council setting out the rationale for the establishment of an internal quality audit system in RGIT. Such a system would monitor the various quality-assurance and quality-control systems described in the last section, thus effectively "guarding the guards". Academic council subsequently agreed with the Vice Principal's proposal that responsibility for co-ordinating the new "meta-quality-control" system should rest with the Institute's educational development unit, since this had an institute-wide brief for promoting and supporting academic development work of all types. It was also neutral in course-related matters, as it did not itself offer courses leading to a CNAA award.

In subsequent discussions between the Vice Principal and the Head of the educational development unit, it was agreed that the latter would set up and lead an institute-wide internal quality audit team, which would report to the Planning and Review committee through the Vice Principal. The team would include a representative from each of RGIT's four faculties. It would also include a representative of the Registry, which is responsible for the management and co-ordination of RGIT's quality programme. Its terms of reference would be "to establish appropriate mechanisms for the appraisal of the Institute's quality-assurance/quality-control procedures and their effectiveness".

It was also originally envisaged that the team would plan and implement formal internal-appraisal events dealing with the Institute's quality procedures in 1991, 1993 and 1995, in preparation for the full CNAA re-accreditation event that was (at the time) scheduled for 1996. Whilst subsequent external developments (notably the Government's decision to disband CNAA in the summer of 1992 and grant full degree-awarding powers,

together with university status to institutions such as RGIT) have removed the original need for this programme, it is intended that RGIT will still organise internal appraisal events. The team has, however, concentrated its efforts to date on carrying out audits of specific aspects of the Institute's quality-assurance and quality-control procedures.

THE FIRST QUALITY AUDIT CARRIED OUT BY THE TEAM

RGIT's internal quality audit team was formally established at the start of the 1990-91 session, and immediately embarked upon the first task that the planning and review committee had asked it to address - carrying out a critical examination of the Institute's annual course appraisal system. Quality control at RGIT involves each course panel carrying out a detailed critical appraisal of the previous year's operations and submitting a report to the appropriate faculty board using a standard RGIT proforma. The faculty boards then report to Academic Council on the outcome of this exercise with respect to their own portfolios of courses.

The quality audit that was carried out by the team took place between October, 1990 and March,1991. It involved critically examining all annual course appraisals that had been completed in RGIT since the Institute obtained CNAA-accredited status in 1988 ie. the annual appraisals for 1988-89 and 1989-90. The bulk of the work was carried out by the faculty representatives on the team, who were asked to seek answers to the following two key questions:

Q1 "Is self-criticism as an ethos operating widely and deeply throughout RGIT?"
Q2 "Are issues identified by Course Panels subsequently being addressed?"

The evaluation was carried out using two specially-designed proformas, the first of which was completed in every respect for every RGIT course that was subject to annual appraisal (55 at the time). The second was used to provide a summary of the findings in respect of courses operated by each faculty. Since the faculty of Science and Technology had operated almost half the Institute's courses during the period under review, the work on its courses was split between two people.

Once the faculty members of the internal quality audit team had finished their work, they submitted their completed proformas to the team chair together with a short report on their overall findings. The resulting material was then circulated to the team and an overall report on the team's findings, conclusions and recommendations was produced. This was submitted to the planning and review committee in March, 1991.

With regard to Question 1, the team came to the conclusion that an overall ethos of self-criticism could not be considered to be as fully developed throughout RGIT as was desirable. Substantial differences between individual faculties, schools and even courses were also identified. In broad terms, the problem seemed to be that critical appraisal tended to be reactive rather than proactive, since the annual course appraisal procedure then being operated had clearly not been successful in encouraging proactive self-criticism on the part of course panels. It was felt that there were two possible reasons for this unsatisfactory state of affairs. Firstly, the guidance given within the standard proforma had perhaps not been explicit enough. Secondly, a more intensive staff development exercise designed to promote a more sophisticated understanding of the underlying philosophy of "a self-critical academic community" would probably have been a good idea. As a direct result of the criticisms and recommendations made by the team, RGIT's planning and review committee decided to carry out a radical review of the procedure.

With regard to Question 2, the team concluded that the issues that were identified by course panels were in most cases being appropriately dealt with - faculty boards playing a key role in this regard. The main exceptions appeared to be issues connected with resourcing, which tended to be noted by the faculty boards but subsequently not always fulfilled - largely due to the general reduction in unit costs that is a characteristic of higher education today.

The team's more detailed findings in respect of each faculty's portfolio of courses and the individual courses therein were passed back to each dean of faculty so that appropriate action could be taken where necessary.

SECOND QUALITY AUDIT CARRIED OUT BY THE TEAM

As soon as it had completed the report on its first audit , the internal quality audit team started work on the second task that the planning and review committee had asked it to address - carrying out a critical appraisal of all validation and progress review events that had been conducted in RGIT since the institute received CNAA accreditation.

Work on this task was carried out between April 1991 and February 1992, using essentially the same approach that had been employed in the first audit. It involved the various faculty representatives conducting detailed critical examinations of the thirty five validations and progress reviews that had taken place in RGIT over the period in question. In order to standardise the procedure, two specially-designed proformas were again employed. The first proforma was completed in respect of each separate validation or progress review, and involved determining whether the detailed procedures set out in RGIT's quality handbook had been properly adhered to. The second proforma was used to provide a summary of findings in respect of the events held within each faculty. To help standardise the process, faculty scrutineers were provided with detailed guidelines on how to complete the two proformas.

Once the faculty members of the team had finished their examinations, they again submitted their completed proformas to the team chair together with a short report on their overall findings. The resulting material was again circulated to the team for discussion and an overall report on the team's findings, conclusions and recommendations was again produced. This was submitted to the planning and review committee in February, 1992.

On the whole, the team's findings were much more positive and satisfactory than had been the case in respect of the earlier audit. It concluded that virtually all the validations and progress reviews that had been carried out had been well organised and conducted. Where problems had arisen, mainly in respect of four events in the faculty of Health and Food, these were almost invariably due to the fact that the course panels concerned had not properly followed the Institute guidelines.

The team did, however, make a number of specific recommendations as to how RGIT's quality-assurance procedures could be simplified and improved. Firstly, it recommended that the amount of documentation required in respect of both validation events and progress review events should be drastically reduced, since the faculty scrutineers had been unanimous in concluding that the present amount was both excessive and unnecessary. This has long been a familiar refrain in CNAA member institutions and it is not without a certain irony that , within the freedom of an accredited institution, this should still be a problem. From an institutional standpoint - as from CNAA in the past - it could be argued that the excessive documentation is not in fact asked for, but rather that it indicates a lack of synthesis and selection of material on the part of the Course Panels. In other words, the blame lies mainly with the validated rather than with the

validators. Secondly, the team recommended that new course validation events should be kept separate from school review events. If incorporated within such reviews for logistical reasons, they should constitute clearly-identifiable, discrete events with separate reports. Thirdly, it recommended that the role of the faculty advisory committees (which scrutinise the documentation before each validation or review event) should be strengthened, thus enabling any major problems to be identified and addressed at an early stage. Fourthly, it recommended that a comprehensive staff development programme should be implemented in respect of the Institute's quality-assurance and quality-control procedures, so that everyone involved will be better prepared to carry out their respective roles effectively. These various recommendations are all being addressed at the time of writing and it is expected that they will all be implemented eventually.

THE PROPOSED FUTURE PROGRAMME FOR THE TEAM

Now that the internal quality audit team has successfully completed its first two audits, it is intended to thank the original faculty representatives for their efforts and allow them to demit office. Replacing them with new representatives will not only spread the work load, but will also enable new people to benefit from the not inconsiderable staff development opportunity that serving on the team provides. The EDU and Registry representatives on the team will be unchanged, thus providing executive continuity. RGIT's planning and review committee has also identified the next two key issues that it wishes the team to address. The first is the effectiveness of the process by which matters relating to quality assurance and quality control are recorded in RGIT documentation minutes of meetings. The second is the extent to which RGIT is succeeding in meeting the CNAA criteria for accreditation, which are likely to be adopted by RGIT even after the demise of CNAA.

CONCLUSION

On the basis of the work that has been carried out so far, the two authors of this paper are in no doubt that the establishment of RGIT's new internal quality audit system has been a great success. The system has proved to be both practicable and effective, with the internal quality audit team being able to complete both its initial tasks more or less to schedule (both took slightly longer than planned). The first two quality audits have produced a large amount of extremely useful information about the effectiveness and efficiency of RGIT's quality-control and quality-assurance procedures. But most important - the audits have identified specific ways in which both sets of procedures can be made even more effective and efficient. The authors therefore commend the RGIT system to other colleges that are thinking about introducing "meta-quality-control" procedures, and will be happy to provide more detailed information on request.

Section 3: Quality in Courses

The conference enabled participants to explore the applicability of different perspectives on quality to educational contexts and practices. Many of the contributions were in the form of case study reports, providing detailed and vivid data and making it possible to explore issues of quality arising in specific initiatives and settings. Participants valued the opportunity to hear what others were doing, and in discussion to clarify for themselves some of the issues to be addressed.

I Musallam, M Brophy and M Schilling in "Improving the quality of a national curriculum: the role of textbooks" report the preliminary results of the evaluation of a national curriculum reform programme which aims to raise the quality of basic and secondary education in Jordan. The curriculum reform strategy relies heavily on the introduction of new textbooks, but even with in-service training there appears to be a mis-match between the use of the books and the aims of the reform. The reformers, curriculum developers and teachers do not have a shared understanding of the meaning of some of the basic reform concepts, and use different criteria in judging the quality of a textbook. The pitfalls of "top-down" reform are illustrated. The medium does not convey the message!

In "Developing quality in education: a way forward" **R J D Rutherford** demonstrates how the principles of total quality management can be applied directly and successfully in education. He identifies core elements and key questions in the systematic and continuous process of developing quality, and illustrates how these have shaped the design of a course for teachers which prepares them to engage in quality development in their own schools. "Practising what he preaches", the author describes some numerical performance indicators for the course.

"Quality in course design" is explored by **Eric Roper** in the context of a professional development scheme for educators working in all sectors of the education system. The scheme is examined in relation to three perspectives on quality: fitness for purpose, how it sets out to meet participants' needs, and how it attempts to empower participants to take charge of their own professional development. Scheme processes and structures are described, emerging issues in relation to quality in course design are discussed, and ways forward in assuring quality are identified.

Louise Gibbs in "Quality horses for quality courses" reminds us that an important element of quality is the matching of students to courses. She addresses the question of what a "quality" student is and suggests that "if there can be unsuitable students for courses, can there not also be unsuitable courses for students?" She identifies lessons to be learned by the new generation, market-led higher education from adult continuing education, explores some of the reasons why students have dropped out of music courses and reports on a training programme for course advisers. She also raises the notion of the place of intuition in advising prospective students.

In a provocative paper, "Recognising quality in engineering education", **D C Hughes and R G S Matthew** consider both the purpose of education and course design features in the context of engineering education at degree level. They outline the components of the "engineering method" and ask how students would recognise that they were on a quality course - one which allowed them to adopt a deep approach to learning and to develop skills in using the engineering method.

16 Improving the quality of a national curriculum: the role of textbooks

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INTRODUCTION: THE CURRICULUM REFORM PROJECT IN JORDAN

Human resource development has been a long-standing priority for the Government in Jordan and investment in the education and training system has served the country well in the past. In the seventies and eighties, for example, large numbers of educated Jordanians were employed in the Gulf region and their remittances were a major economic factor in the national economy. Today enrolments at the basic, secondary and higher education levels are amongst the highest in the world and it has been estimated that at present every third Jordanian citizen is involved in some form of education or training (General Directorate of Planning 1989).

The nineteen fifties, sixties and even seventies were periods of rapid expansion in education. This expansion was often at the expense of quality, so that by the mid-eighties there was a growing awareness of the need for reform of the education system itself. Research into the quality of education, especially science education, revealed a picture of overcrowded, under-resourced classrooms and ineffective teaching methods (Abu Sardaneh 1983; Ismail 1981; Abdalla 1990).

In his speech at the opening of the National Assembly in 1985, His Majesty King Hussein called for the launching of a national programme for education reform and in September 1987 under his patronage a National Conference of Educational Reform (NCER) was inaugurated with the express purpose of developing a plan of action. Following from this conference a ten-year national reform programme was developed and is currently being implemented with assistance from a number of organizations including The World Bank, The British Overseas Development Administration and The British Council.

The primary purpose of the reform is to raise the quality of basic and secondary education and so improve the nation's manpower base so that it will be better able to meet both the domestic needs and those of the region's scientific and technological labour markets. To achieve this the Government established National Subject Panels to revise the curricula.

These teams were charged with developing curricula whose content and approach would emphasize:

1. fostering creative thinking by the use of materials and approaches which promote critical thinking, problem-solving, analytical and information processing skills
2. enhancing student achievement by building flexibility in curriculum especially to allow for the ability range of pupils
3. modernizing curriculum content and making it relevant to current conditions and issues such as environmental and health issues
4. re-orienting classroom teaching methods to emphasize activity-based experiences and applied learning
5. providing teacher guidance to encourage greater creativity and flexibility in implementing the curriculum

6 enhancing the occupational and vocational orientation of students
7 designing continuity and integration into the curriculum of different grades and subjects.

THE ROLE OF TEXTBOOKS IN THE REFORM

Two basic processes are being used to implement the curriculum reform, namely the development of new textbooks and A/V materials and the in-service training of teachers. Text books are seen as having a pivotal role in the reform process. In fact the project has been categorized as a textbook-led reform and a considerable part of the in-service training is devoted to training teachers on the use of the new books.

Year	Grades Levels to be Implemented		
1991	1	5	9
1992	2	6	10
1993	3	7	11
1994	4	8	12

Table 16.1 *The schedule for implementing the reform*

Although the basic curricula for all five subjects were prepared some of the texts were not completed on schedule and so only twelve of the fifteen books proposed for introduction in September 1991 have been implemented. Nevertheless the project has started well. Almost 1.5 million new books have been distributed and are in use in schools.

The plan of action for the reform called for the new texts to be evaluated during their first year of use, so that they could be revised during the second year and "final" editions introduced in the third year.

To organize and carry out the evaluation the Ministry of Education established a Evaluation Division in September 1991 based in the General Directorate of Curriculum and Educational Technology (GDCET).

DEVELOPING THE EVALUATION STRATEGY

The first questions that the staff of the new division had to address were, "What was the purpose of the evaluation ? What was it that was to be evaluated and why?" It was difficult to get a consensus on this, partly because of the organizational structure within the Ministry of Education. Development of the curriculum and the text books is the responsibility of the GDCET while in-service training is the responsibility of the Training Centre. The Evaluation Division is based in and staffed by members of GDCET and one view was that it should only evaluate the work of it's own general directorate, i.e. the curricula and the text books. A second view was that textbooks could not be evaluated in isolation from how they were used in the classroom. And how the books were used must inevitably depend on how teachers were trained to use them.

A compromise was reached in that the strategy eventually accepted was designed to

evaluate three things.

1 The books themselves
What could be called their "technical" aspects (accuracy, printing quality, illustrations).
2 The suitability of the books
Eg. how well they matched the level of the pupils, the needs of the local community and the conditions in schools.
3 The way the books were used
Eg. were they used didactically with the teachers reading and explaining the concepts or were they used by the pupils in group work or for following activities.

THE STRUCTURE AGREED

Subject Grade	Maths	Arabic	Science	Islamic Studies	Social Studies
1	+	+	+	+	+
5	+	+	+	+	+
9	+	+	o	o	o

Table 16.2 *New texts introduced into Jordanian schools in September 1991*

Twelve new texts were introduced into the schools in September 1991 and the Evaluation Division is responsible for evaluating them during 1991-92. Just as there had to be a compromise on the purposes of the evaluation so too was there a compromise on the structure used. Many different personalities and groups were involved in the discussions, and the specialists from the different subject areas and the "customers" who were to receive and act on the evaluation feedback had varying opinions on what information would be most useful to them. In the end after a three month cycle of proposal, discussion and revision a two stranded approach was agreed on and approved by the Minister and Committee of Education. The two strands are the continuing and the final phase.

The Continuing Phase

For each of the books being evaluated twenty-five teachers have been chosen from five representative regions of the country. The teachers are asked to keep daily teaching logs for one of the twelve books, using a prepared reporting format.

A supervisor from each region visits one teacher each week to interview them about their experiences as recorded in the daily logs and to observe a lesson. Structured interview forms and detailed observational schedules are provided. The supervisors received a three-day training session on interview and observational techniques. Video films were used to establish standardized and agreed procedures.

From the continuing phase it was intended that we should get information for each

book on the teaching experiences of twenty-five teachers who had taught it throughout the year. If each teacher was interviewed and observed once every five weeks then in a thirty-week teaching year we should have information from 150 (25 x 6) interviews and 150 lesson observations.

The Final Phase

To supplement and provide some cross referencing for the on-going strand it was agreed that during the last month of the academic year questionnaires would be sent for each book to teachers in 5% of the schools in the 23 regional educational directorates. The questionnaires were designed to provided additional evidence about the suitability and use of the books rather than to elicit responses about technical problems.

A parents' questionnaire has also been designed and will be distributed to the parents of 150 pupils over all regions following each book. Both the teachers' and the parents' questionnaires were piloted during February and are scheduled for distribution in May.

THE RESULTS

A number of the books are being published in two parts, one for each semester, so it was possible to carry out a preliminary analysis of some of the texts based on the results from the continuing phase collected over the first semester. The books have been generally well received by the teachers and are considered to be a major improvement on the old text. Although from the results obtained so far it is clear that the teachers and supervisors are generally more inclined to comment on the "technical" aspects of the books, the misprints and mistakes, rather than on their suitability and use. A variety of "errors" have been identified for each book including printing, cultural and contextual errors.

The types of errors identified varied from book to book but followed a logical pattern in that in the lower level books there were relatively more difficulties with language and illustrations and fewer with exercise questions. Specific language difficulties were often to do with vocabulary.

	Language	Illustrations	Exercises	Total
Grade 1 Arabic	101 (45)	93 (41)	33 (15)	227
Grade 5 Science	58 (28)	64 (31)	83 (40)	205
Grade 9 Maths	15 (24)	16 (26)	31 (50)	62

(percentages in brackets)

Table 16.3 *Comparison of types of problem reported for three books*

One of the main concerns was the level of dissatisfaction expressed with the illustrations in the books for the lower grades especially over the lack of clarity and the numbers of contextual and cultural errors. Exercise questions in the books were generally seen as being too difficult. Although in light of this there were surprisingly few reports about the books failing to cater for the range of pupils' abilities and their individual differences.

THE USE OF THE BOOKS

One disappointment for those involved in the reform has come from the reports and observations about the way the books are used. A major aim of the reform is to encourage more pupil-centred and activity-based learning and teaching. It had been expected that with the introduction of the new texts and in-service training there would be a move away from didactic methods towards greater pupil involvement and that this would be reflected in the way the books were used. Unfortunately this does not appear to have happened so far. The reports on the science book, for example, show that the books were still predominantly being used by the teachers. The main pupil usages were for doing exercise questions and home work. There wasn't a single instance of that book being used for group work in science.

IMPLICATIONS FOR THE EVALUATION

Problems of Reliability

One problem which the results have highlighted is the difficulty experienced in achieving a shared understanding of the meanings of some of the key concepts of the reform, concepts such as "problem-solving" and "catering for individual differences". Although the supervisors received specific training on using the observation schedule there was still a wide variation in the way that they reported seeing these concepts being implemented in the classroom. For example one supervisor reported that there was no evidence of problem-solving activities in any of the twelve lessons he observed while another reported that he saw it in nine of the eleven lessons observed.

Region	1	2	3	4	5	Total	%
"Yes"	9	3	6	6	0	24	45
"No"	2	5	9	1	12	29	55

Table 16.4 *Reports of problem-solving activities observed in lessons*

Region	1	2	3	4	5	Total	%
"Yes"	12	9	8	7	12	48	98
"No"	0	0	1	0	0	1	2

Table 16.5 *Reports of observations of teachers catering for individual differences*

At present we are unable to say if this was a real difference (ie. in the teaching) or simply a difference in the supervisors' interpretations. There was more agreement amongst the supervisors about teachers catering for the individual differences of the pupils. Here the supervisors noted that the teachers did this in all but one of the 49 lessons observed. But the explanations of what was accepted as "catering for individual differences" varied greatly. Since these results a second round of training workshops has been held and modifications made to the instruments to try to achieve a greater degree of "mutual" understanding.

The Difficulty of Defining "Quality" for Textbooks

When starting the evaluation one of the questions asked was "What are the qualities of a good textbook? What characteristics should it have?" A recent study of a series of textbooks in Texas found that they had an average of over 700 mistakes per book yet the publishers claimed that "everyone agrees these are the best textbooks they've ever seen" (*The Guardian* 1992).

So how important is accuracy as a criteria for a good textbook?

As part of our study we surveyed teachers and curriculum workers to see what they felt were the most important qualities that a good textbook should have. Using the opinions of a group of regional supervisors a list of the ten most important criteria for good textbooks was derived. A sample of forty-five teachers were then asked to rank each of these criteria in order of importance. The results are shown in Table 16.6 below.

Criteria	Teachers (45)		Curriculum Specialists (34)	
	Rank	Mean	Rank	Mean
Relates to local community	1	(8.1)	6	(4.4)
Suits ability level of pupils	2	(8.0)	2	(8.5)
Meets curriculum objectives	3	(6.7)	1	(9.3)
Ideas/concepts logically sequenced	4	(6.2)	4	(6.6)
Clear presentation of ideas/concepts	5	(6.1)	3	(7.3)
Clear printing	6	(5.6)	9	(3.7)
Correct/no mistakes	7	(3.8)	10	(3.0)
Has activities which can be done	8	(3.7)	7	(3.9)
Uses a variety of approaches	9	(3.6)	5	(4.6)
Good clear illustrations and diagrams	10	(3.5)	8	(3.7)

Table 16.6 *The qualities needed for a good text book: opinions of teachers and curriculum specialists*

For teachers "relating to local community" and "suiting the ability level of the pupils"

were the two most important criteria. Accuracy was seen as being relatively unimportant, being ranked only seventh in order of priority and "good clear illustrations and diagrams" was rated as the least important.

The views of the thirty-four curriculum specialists in the curriculum directorate were also obtained. Their opinions correlated only moderately (rank order $p = 0.56$) with those of the teachers. Not surprisingly the curriculum workers placed greater emphasis on the textbook meeting "curriculum objectives" Relating to the local community was ranked only sixth. Both groups gave high priority to suiting the pupils ability level and to presenting ideas and concepts in logical sequence.

But what was noticeable was that like the teachers the curriculum specialists gave a low priority to "technical" aspects; accuracy was ranked as being the least important of the ten, clear printing was ninth and clear illustrations and diagrams eighth in order of importance.

The high priority given to curriculum objectives, suiting ability level, sequencing and presentation (contrasted with the low priority given to the technical criteria) suggests that the textbook is still seen as being a content or sequencing guide and the chief source of information for teachers.

Problems with the technical criteria are only important when the pupils use the books since they can be mediated if the materials are teacher-directed. Similarly the low ratings given to activities and different teaching approaches suggests either that these are seen as having a low priority in teaching or that they are the domain of the teacher not the textbook.

From the results we suggest that for these teachers and curriculum specialists the textbooks have a very specific function. They are guides to the curriculum which the teachers can feel safe in using. The "good" textbook provides the teacher with the information he or she needs to teach, assured that it suits the level of the students, is relevant to the local community and is clearly presented and logically sequenced. Setting out the teaching methods and the activities to be used are not seen as being a major part of a text book's functions. Activities are to be determined and organized by the teacher.

The question is, is this view of the role of the textbook consistent with the aims of the Jordanian reform? Will we ever achieve pupil-centred, activity-based learning which develops critical thinking and problem-solving skills if the curriculum is still being mediated through the textbooks which in turn are used almost exclusively by teachers?

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17 Developing quality in education: a way forward

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INTRODUCTION

Quality has now become a major concern in all sectors of education. But what is meant by quality and, assuming we can agree on a definition, *where* and *how* can quality be developed? This paper will address these three key questions, explore the relationship with total quality management, and describe a course for teachers which not only attempted to exemplify the principles of total quality management but also to prepare the course members to begin the work of quality development in their own schools.

WHAT IS MEANT BY QUALITY?

There are a number of overlapping perspectives - drawn from industry and commerce - which seek to define the meaning of quality. Each perspective has a rather different emphasis. Quality may be about perfection, inspection, conformance to requirements, fitness for purpose, improving customer/client satisfaction, or empowering the customer/client. These perspectives raise interesting implications when applied to education. Does inspection - the ritual pouring on of quality at the end of a process - mean that 20% of students must fail in order to "preserve standards"? Does conformance to requirements - which emphasises "quality systems" and "getting it right first time", prevention rather than inspection - reduce a teacher's freedom to abandon a well-planned class and attend to a particular concern or difficulty? Does fitness for purpose beg the question of whose purpose should have priority: teacher's or student's? Does empowering the customer/client - giving power to the student - mean enhancing their ability to exact sanctions if they think that the education they have received is unsatisfactory?

In the opinion of the author, quality is about improving customer/client satisfaction or, in educational terms, improving the quality of learning for students. In practice, this means engaging in a systematic and continuous process of development and incremental change that is heavily dependent for its success on all the "partners" having meaning, purpose and satisfaction in their work.

WHERE CAN QUALITY BE DEVELOPED?

A very simple model of a school can be constructed which identifies the major processes in the system (Hall 1989): inputs; transformations; and outcomes. Inputs include policies, staff, students, resources, and so forth. Transformations include teaching, tutoring, learning, assessing, as well as staff training and development. Outcomes include the academic, personal and social development of students and staff, and examination results. The satisfaction of students, their parents, their future employers, and so forth, with the education that has been provided should also be considered. It is clear that to develop quality in all these aspects of a school's work would be a formidable and in some respects perhaps an unnecessary task: priorities for development must be established. This issue has been well recognised in schools with the introduction of school

development plans (Hall 1990; Hargreaves and Hopkins 1991). Such plans identify specific objectives to be achieved during the forthcoming year and include detailed action plans to show how these are to be achieved, and longer term objectives for the following two or three years. Staff appraisal schemes are now being introduced in schools and will help to ensure that the needs and aspirations of individual teachers are in harmony with the needs and aspirations of the school, as articulated in the school development plan.

HOW CAN QUALITY BE DEVELOPED?

Whale and Ribbins (1990) have led a major initiative in quality development in the Birmingham LEA. They have brought together the experience schools have acquired in development planning with a systematic approach to monitoring and evaluating. Building on their work, the author has emphasised the importance of considering the present and future needs of the stakeholders or partners in the school, of a systematic strategy for implementing planned change, and of leadership and team work. Thus developing quality in education is, in the author's opinion, a systematic and continuous process that involves four core elements: strategic and action planning; implementing, monitoring and evaluating planned change; responsive and flexible leadership; and co-operative and supportive team work. These four core elements are clearly related to Oakland's (1989) four major components of total quality management: a quality system; statistical process control; management commitment; and team work. The author has found Oakland's ideas and analysis invaluable. The following quotation, in particular, has proved most useful when talking to colleagues about total quality management.

> "The author and his colleagues have heard the excuse that 'our industry (or organization) is different to any other industry (or organization)' in almost every industry or organization with which they have been involved. Clearly, there are technological differences between all industries and nearly all organizations, but in terms of managing total quality there are hardly any at all" (Oakland p 159).

A COURSE FOR QUALITY DEVELOPMENT

The course was a three-term, ninety-hour course for experienced teachers in primary and secondary schools leading to an Advanced Certificate in Education or, with further study, an MEd. The first two terms' work consisted of lectures, discussions and workshops, and tutorial support for the assignments. The third term's work was devoted to action learning projects which focused on quality development in the teachers' own schools. The course was held not at the University but, on alternate weeks, at two of the teachers' schools - outreach centres. The author's aim statement for the course was:

> "To design and deliver a course - based on the four core elements: planning; feedback; leadership; and team work - that will enable the participants to develop the knowledge, skill, experience, confidence and enthusiasm to begin and to continue the work of quality development in their own schools."

The course was built around ten key questions. The first four of these focused on strategic planning: What are we here for? Where are we now? Where do we want to get to? What do we need to focus on? Thinking about the second and third of these questions naturally leads to the fourth: the "quality gap". The fifth question was about action planning: How do we get there?

A systematic strategy for implementing planned change was described in response to the sixth question: How do we effect change? This strategy involved identifying the various stakeholders who were effecting or were affected by the change, and then analysing each group in terms of six decisive factors. These are: linkage; openness; gain/loss; ownership; leadership; and power (Lindquist 1978; Berg and Ostergren 1979; Rutherford 1992). The different purposes for monitoring and evaluating and the different techniques - questionnaires, interviews, and observation schedules - (Hopkins 1989) were also described to answer the seventh and eighth questions: How are we doing? How have we done?

PERFORMANCE INDICATORS FOR THE FIRST TERM

1.	Target number of students:	20
2.	Number of students at the first session:	13
3.	Number of students who actually enrolled:	18
4.	*Percentage of number of students enrolled/target:*	*90*
5.	Percentage attendances for the nine taught sessions (the tenth session was a "reading week" at half term): 87 88 72 83 94 83 94 94 66	
6.	*Average percentage attendance:*	*84*
7.	Number of visits to see students in their own school:	13
8.	*Percentage of visits to see students in their own school:*	*72*
9.	Number of standard end-of-term questionnaires returned:	7
10.	Percentage of questionnaires returned at the final session (13 students were present):	54
11.	*Medians of the students' responses on a 1 to 5 scale (where 5 is the most favourable response) to the ten statements on the questionnaire: 4 5 4 5 5 4 4 5 4 4*	

PERFORMANCE INDICATORS FOR THE SECOND TERM

1.	Target number of students:	18
2.	Number of students who are continuing with the course:	17
3.	*Percentage of students continuing:*	*94*
4.	Number of first assignments handed in within three weeks of the deadline:	14
5.	*Percentage of first assignments handed in within three weeks of the deadline (17 maximum):*	*82*
6.	Grades for the assignments: A A- A- A- B+ B+ B B B- B- C+ C and two returned unmarked	
7.	Percentage attendances for the nine taught sessions: 82 88 88 88 88 82 88 88 88	
8.	*Average percentage attendance:*	*87*
9.	Number of visits to see students in their own school:	9
10.	*Percentage of visits to see students in their own school:*	*53*
11.	Number of standard end-of-term questionnaires returned:	11
12.	Percentage of questionnaires returned at the final session (15 students were present):	73
13.	*Medians of the students' responses to the ten statements on the questionnaire: 5 5 4 5 5 4 4 4 4 5*	

Table 17.1 *Course performance indicators*

However, following Oakland's suggestions, some numerical performance indicators were also collected for each term's module of the course (Table 17.1). For example, the average percentage attendance; the percentage of assignments handed in for marking; the medians of the students' responses to an end-of-term questionnaire; the percentage of students who continued on to the following term. This data was, arguably, invaluable for monitoring the quality of the course and to demonstrate that the author "practised what he preached". It does not explain the reasons for problems but certainly shows if problems exist. Such data has not been commonly collated in the School of Education but as an increasing amount of our work takes place in outreach centres or is on contract, it will be needed to fulfil any requirements for accountability. When similar data becomes available it will be very interesting to compare the performance of the courses at all four outreach centres, and indeed with more traditional courses that are held in the School of Education.

In practice, these eight questions or stages in planning for quality development fuse into one another. And the process of planning is at least as important as the final document. However, ensuring that the plan is actually implemented, monitored and evaluated - which depends on leadership and team work - are the most difficult and challenging parts of the whole process. Thus the last two questions in the course focused on leadership and team work: How can we develop our effectiveness as leaders? How can we build teams?

A number of perspectives on leadership and team building proved useful in the course (Rutherford 1992). First, there are the personal qualities and associated actions that followers look for in leaders if they are to give exceptional performance. Kouzes and Posner (1987) identify four such qualities: honesty; competence; vision; and enthusiasm. They emphasise that credibility is the foundation of leadership. Second, there is the work of Adair (1990) which focuses on three complementary functions that the effective leader must attend to: achieving the task; building the team; and developing the individuals in the team. Adair (1990) and Belbin (1981) have much to say about building teams that the course members appreciated. Third, there is the work of Blanchard et al (1987) which emphasises that followers have different needs, which depend on the particular task in hand, so that leaders need a variety of styles and the ability to match the appropriate style to the follower's needs. Fourth, the work of Argyris (1982) and Schon (1987) on theory-of-action underlines the difficulty of practising what we preach, of ensuring that our behaviour really does match our stated values.

CONCLUDING REMARKS

The course is interesting in that it aims both to prepare the participants to engage in quality development in their own schools, and to be an exemplar of a "quality course". A great deal of care went into planning and delivering the course, and into providing tutorial support. Visiting teachers in their own schools proved extremely beneficial in helping to build and cement good working relationships, and to talk through problems. "Keeping close to the customer" was one of the author's priorities. A strong sense of group identity and commitment developed during the course which was reflected in the performance indicators. Oakland's framework for total quality management has provided the theoretical basis and inspiration for the course and, in the author's opinion and experience, these principles can be applied very successfully in education. They underpin a way of working described in this paper that can empower individuals to deliver quality in education. However the larger task remains: introducing total quality management throughout the whole school.

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18 Quality in course design: empowering students through course processes and structures in a professional development scheme

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INTRODUCTION

The PGDip/MEd in the Faculty of Cultural and Education Studies at Leeds Metropolitan University (formerly Leeds Polytechnic) is a professional development scheme for educators working in all sectors of the education system. It is argued that the quality of participants' experiences in the scheme depends on a flexible and coherent scheme structure which is consistent with and responsive to clearly articulated scheme processes. The scheme will be examined in relation to three perspectives on quality: fitness for purpose, how it meets participants' needs and how it empowers participants to take charge of their own professional development.

In 1990 the MEd was re-designed as a linked, modular Postgraduate Diploma/Master of Education Scheme. What had been a three year, cohort-based, part time MEd in applied research in education, became a flexible professional development scheme which, although it retains a commitment to using research findings in exploring educational practices and to the preparation of participants to undertake naturalistic research in the MEd dissertation, also offers a wide range of elective modules which enable participants to examine substantive areas of educational practice.

The PGDip consists of 12 modules, 6 core and 6 elective; satisfactory completion of the PGDip permits entry to the Master's stage, which is based on a 16,000 word dissertation (equivalent to 8 modules). As well as Curriculum Issues and Assessment Issues, which provide frameworks for conceptualising key elements of the educational process, the core PGDip modules are Approaches to Research in Education, Collaborative Action Research and Recording, Reviewing and Planning (double module); for participants intending to proceed to the MEd, two of the six elective modules must be Case Study Research I and Case Study Research II. There are currently 32 validated PGDip elective modules. These include generic, subject specific and sector specific modules, for example Human Relations, Mathematics Education and Early Years modules, and participants may take management-focussed electives from the MSc in Education Management.

SCHEME PROCESSES

The PGDip/MEd has been designed as a professional development scheme and, as such, seeks to empower participants to take charge of their own professional development. The flexibility stemming from its modular design facilitates this, but flexibility of this kind has been tempered by a commitment to certain scheme processes which constrain participants' freedom of choice, at least at the structural level, for example by limiting the number of PGDip electives to six (four if participants intend to proceed to the MEd).

Because the scheme seeks to promote in participants the ownership of change as a basis for professional development and professional learning, the methodology of all modules seeks to enable participants to articulate their professional experiences, re-examine and make explicit their professional values and goals, reflect on and analyse taken for granted

arrangements and practices, and identify any felt unease about their day to day professional activities in terms of mis-match between aspiration and present experience. Professional development is grounded in such activities, for it is through them that participants come to understand the nature of and need for change, recognise what it is in schools, classrooms and themselves that makes change difficult to accomplish, feel some control over the situation, construct and own agendas for personal action, and develop a motivation for change that is personally founded (Rudduck 1988).

All scheme modules focus attention on how individuals and groups, including scheme participants, see their situations, and on how these different perspectives are influenced by prevalent educational theories, ideologies and personal value systems, and all make use of active teaching and learning strategies which sharpen participants' skills to act in these situations. Moreover, all modules must address the generic objectives of the scheme: to enhance participants' self-awareness, insight, capacity for constructive criticism, capacity for rational action based on reflection, interpersonal skills and active professionalism.

The double PGDip core module Recording, Reviewing and Planning underpins the whole scheme and is central to its process. It involves participants in reflecting, reviewing, recording and target setting, collaboratively as well as individually. These activities enhance participants' understandings of themselves, and support their search for identity as professionals. They enable participants to feel some sense of individual power at the centre of the action, not only in terms of the scheme itself, but also in relation to their professional lives as the scheme activities impact on their day to day work.

The research modules in the PGDip are derived from the original MEd and are intended to provide participants with a thorough grounding in the naturalistic research methods they are expected to use in their dissertations. Furthermore, experience in the original MEd confirmed the value of a course process grounded in naturalistic methodology for promoting both the personal and professional development of practitioners: participants were able to identify ways in which their interactions with colleagues had been transformed by their understanding of, for example, the need to explore the meanings invested by different individuals in events and practices in the workplace, by their articulation for themselves of ethical principles of procedure, and by their development of the interpersonal skills needed by the naturalistic researcher.

The research modules are also intended to empower participants to make enquiries into the learning which they facilitate. Priority is given to equipping all participants in the scheme to approach in a more informed and skilled way the situations and problems which they encounter, or might expect to encounter, during their daily professional lives. As a means to this end, it is thought to be of fundamental importance that teachers and other professionals in education who are responsible for actions within professional settings should be equipped to research the consequences of such actions and progressively identify and focus attention on significant and important issues and problems in the specific settings in which they occur. In this sense the scheme attempts to bridge the gap between practitioner and researcher as a basis for participants' professional development.

SCHEME STRUCTURES

Scheme structures should be fit for these purposes and, ideally, take their form from scheme processes.

The flexibility inherent in a modular scheme, together with the range of electives, has certainly assisted in the marketing of the scheme which, now in its third semester of

operation, has over 50 participants. Unlike the original MEd, participants may join the scheme in any semester (starting in October or February), and may take semesters out or vary the number of modules taken in any semester, according to personal and professional circumstances. The Scheme Leader manages a staffing budget and, because most elective modules have been designed to be offered as taught or tutored modules (with contact time adjusted pro rata according to numbers of participants) or by independent study, it is possible to offer participants their preferred elective modules by adjusting the mode of delivery to take account of available resources.

Because most scheme modules generate activities and investigations that participants complete in the workplace, they are delivered as long, thin modules, one in each half of the PGDip/MEd evening, using 10 or 12 of the sessions in the 15 week semester. Taught modules have c 18 hours of contact time out of a total workload of between 45 hours (minimum) and 75 hours (maximum).

The Recording, Reviewing and Planning double module is completed in action learning groups (ALGs), consisting of approximately six participants and an ALG adviser, meeting throughout the period of its members registration for the PGDip. (ALGs are reconstituted for the Master's stage of the scheme). In the PGDip these groups meet on six occasions each 15 week semester, for periods of between one and three hours, giving a total of c 10 hours each semester. This arrangement is a deliberate attempt to counteract what could in a modular scheme become a fragmented experience, by enabling participants to identify with a cohesive group.

Action learning groups are mutual support groups, which provide help and advice for members, who are engaged on similar practical tasks. In the PGDip the task is to complete the Recording, Reviewing and Planning module, while at the MEd stage ALG members are preparing their dissertations. The ALG adopts an action frame of reference, and members question each other about progress and blockages in exploring what has been done and what needs to be done. Each member is challenged to verify facts and interpretations, and to justify proposals. By reflecting on what they are doing, members of the action learning group see how to do it better, and consult others in the group in the act of getting it done. In helping each other, participants see more clearly how to help themselves. The variety of participant professional backgrounds in the ALG (typically reflecting all sectors of the school system, further and higher education and nurse education) is an asset, for example in challenging members' definitions of their situations.

Scheme tutors act as advisers to action learning groups, and are responsible for providing participants with both academic and pastoral support. In the ALGs participants explore their reactions to the scheme, their professional development concerns and goals, and identify ways in which the scheme might be used to meet individual needs and achieve personal goals. In the PGDip, the tasks participants complete with the support of their ALG are in practice:

- log/diary/journal keeping, recording their experiences in the scheme and making links between the scheme and the workplace;
- the preparation of programme proposals for the next semester, which state professional development targets and identify strategies for achieving them, and which can include proposals for Independent Study modules (written by the participants themselves to meet identified professional development needs) and requests for advanced standing based on previous study or professional development experience; and
- the preparation of the Statement (the module assignment for Recording, Reviewing and Planning submitted at the end of the last PGDip semester, and requiring

participants to identify their learning and development during the PGDip stage of the scheme, grounding their claims in data extracted from the log/diary/journal, programme proposals and module assignments).

The style of working in the ALG and the production of the Statement also contribute to participants' understanding of naturalistic research in preparation for the MEd dissertation. Work in the ALG makes participants aware of the diverse "multiple realities" of ALG members as they give meaning to their experiences in the scheme, while the Statement is a kind of case study of each participant's experience of the PGDip stage of the scheme, and is focussed on issues which are explored and grounded in data. The delivery of the module Case Study Research II, which is focussed on data analysis and presentation, is able to draw on participants' experiences of preparing their Statements.

Participants' programme proposals are examined by the scheme's Approvals Board. The scheme sets out to embody maximum flexibility and deliberately imposes few restrictions on participants' decisions about the order in which to take modules, because individual participants will start from different points in terms of previous experience and initially perceived needs. ALGs help participants to articulate their growing awareness of their own professional development, and to develop programme proposals which match their needs. The scheme process is an enabling one, supporting participants in developing programmes which have coherence and progression in terms of individual professional development needs. The headings to be used in writing programme proposals, independent study module proposals and requests for advanced standing, together with the criteria to be applied by the Approvals Board in considering them, are stated in the scheme handbook.

Because the PGDip/MEd was validated as a professional development scheme, rather than as a course in the traditional sense, an Approvals Board was considered essential for examining participants' proposed programmes of study; its existence also enables modules to be revised and new elective modules added to the scheme in response to the emerging needs of participants. The criteria to be applied by the Approvals Board have an enabling function; they are written to support participants' in arguing the case for individual programmes of study which meet articulated professional development needs.

In the scheme documentation, attention has been given to the information needs of scheme participants and tutors. As well as stating the criteria to be applied by the Approvals Board, the scheme handbook includes protocols (which set out scheme requirements) for the log/diary/journal, action learning groups (identifying the responsibilities of both advisers and ALG members), the Statement, MEd dissertations, and procedures for negotiating a research contract in educational settings; guidelines for module assignments, programme proposals and for independent study module proposals; glossaries of scheme and research terminology; and module syllabuses.

Within the scheme, module syllabuses (other than those which describe research training experiences) are seen as frameworks upon which participants and tutors can negotiate module programmes which meet the professional development needs of participants, as identified in their programme proposals. The scope of the negotiation involved not only covers matters of content in relation to objectives, but also of learning and teaching styles and assessment. The topics, issues or enquiries which participants pursue for assessment purposes may arise from programme content or contribute to it, and module assignments may be produced in a form suitable for a specific audience or use in the workplace (as long as they address the scheme's three assessment domains: literature and theory, reflection and analysis, and application and reflexivity).

QUALITY IN COURSE DESIGN: SOME EMERGING ISSUES

It can be argued that the quality of course design is best gauged by the quality of participants' experiences, and that in a professional development scheme the latter depends on developing a flexible and coherent course/scheme structure which is consistent with and responsive to clearly articulated course/scheme processes - processes which empower participants to take control of their own professional development by identifying and meeting professional development needs. That this has been achieved to some degree is evidenced by participants' perceptions of the strengths of the scheme, and of the opportunities it offers them. Nevertheless, weaknesses and threats as perceived by participants and tutors have to be addressed.

The commitment of the scheme as a whole to the naturalistic inquiry/research paradigm, and the implications of this for participants' programmes and activities both within the scheme and in their own work situation, is made clear to all prospective participants in advisory seminars and interviews. Nevertheless, participants understand and/or are committed to the scheme process to different degrees, particularly in the early semesters. Thus in a SWOT analysis of the scheme after the first semester of operation, groups of participants identified the following as "threats": "people who are pressuring for an old style MEd and won't engage in active learning (and the danger of tutors going along with them even if it goes against the ethos of the course)"; "getting to know you activities" (presumably the structured trust and climate building activities used in the first sessions of the semester prior to participants forming themselves into ALGs); programme proposals; and the "journal - for some".

As the scheme grows, participants who have overcome the "general insecurities which come with starting a new course" will be able to reassure new entrants, but in a sense participants will only come to understand and value the scheme processes through engagement in them. The quality of their early experiences in the scheme will be critical, and the perceived "disparity between the quality of leadership of the ALGs", and participants' "not being absolutely clear", and the "the number of new elements" they have to cope with, are perceived "threats" that ALG advisers will be able to help participants deal with only if the expanding team of ALG advisers understands and shares the ethos of the scheme and the way this is translated into processes and structures.

In the first semester of operation, the ALG advisers were those tutors who had developed the use of ALGs in the original MEd, and so had experience of the ALG adviser role. As the team has expanded not all ALG advisers have had previous experience of the role. Even for those tutors who have had this experience, the role has expanded: as expressed by one group of participants, the "limited amount of time available presents a threat when considering the complexity of professional issues" to be addressed; and the range of tasks to be completed with the support of the ALG has increased, as has the range of skills participants are required to develop.

That some participants have found the log/diary/journal keeping a threat is understandable, because it involves the identification of feelings (diary) in relation to events (log) and, standing back somewhat, the acknowledgement of the issues, threads and themes that they reveal and that are of significance in the participant's professional understandings and actions (journal) (Holly 1989). In the ALG participants are encouraged to share from these records, and although they control the release of this data, this sharing requires the disclosure of personal information. If they are going to reveal themselves to others in the ALG, trust in other group members is essential. Issues relating to the timing and duration of ALG meetings are significant here, as participants have identified: "ALGs - too infrequent to be the driving force of the programme -

sessions too long - more frequent, possibly shorter, sessions (needed)".

In the participants' first semester, much of the time in ALGs is taken up with coming to understand the scheme requirements, particularly in relation to log/diary/journal keeping and programme proposals, and although these are intended to be enabling devices for identifying and working on professional development targets and strategies, and participants are encouraged to find their own best ways of completing them within the requirements and guidance provided, not all participants "own" them in this way. It takes a minority of participants considerable time to see their value for their own purposes rather than as externally imposed "threats", and either concerns about what is expected are expressed and have to be dealt with or they are completed in a mechanistic fashion, with little investment of self in the process and with little evidence that professional development targets and strategies are grounded in log/diary/journal work. There is a tension between using time in the ALG to promote the scheme's agenda in terms of requirements, and giving participants the opportunity to create their own agendas, which is perhaps reflected in the view that there is "not enough 'informal' time in the ALG".

Participants are encouraged to use the ALG, log/diary/journal, independent study opportunities, modules and module assignments strategically in order to achieve the professional development targets identified in their programme proposals. Ideally participants will take modules in the scheme in order to work towards these targets, and will know enough of what they want from a particular module to negotiate appropriate content and delivery strategies. This negotiation may, however, be too early for optimum decision making and not allow for the clarification and refining of targets or the identification of more significant targets as the module unfolds. Although most modules are validated for delivery in different modes in order to make them more available, some participants prefer taught modules and are disappointed that modules they wish to take are not available in this mode of delivery; on the other hand, many participants prefer modules to be delivered as tutored modules, giving them more time to work independently or in syndicates and to focus on their own particular issues and concerns.

The documentation provided in the scheme handbook has provoked the following comment: "scheme outline difficult to understand, jargon laden - needs to be written in user-friendly English". While not wishing to dismiss this criticism, it reveals the problem of how to initiate new entrants into the culture (including the language) of the PGDip/MEd scheme so that, through their own activities within it, they can begin to own and shape it.

ASSURING QUALITY: WAYS FORWARD

Participants' and tutors' experiences within the scheme are reviewed each semester in formal scheme monitoring meetings. One source of data for these meetings is the University's Student Evaluation Questionnaire, designed for use across all courses but permitting course-specific items to be added. The challenge faced by scheme tutors (and participants) is to develop items for this instrument which reflect the culture of the scheme and the specific issues identified by participants in SWOT analyses of the scheme as a whole and in module reviews. ALG advisers have regular contact with participants, and given that one of the tasks of the ALG is to help participants to review their experiences in the scheme, detailed feedback is available to tutors. The Statements produced by participants at the end of the PGDip will provide valuable additional data.

Given the commitment of the scheme to naturalistic methods of inquiry and research, it is intended to apply these in evaluating the scheme itself. Currently the scheme leader is using action research methods to investigate his own role as an ALG adviser, and this

will produce materials for use in ALGs and in staff development activities with tutors (Roper 1992). There is scope for ALG advisers to undertake collaborative action research into this centrally important tutor role within the scheme, and for ALGs themselves to explore their different cultures in inter-group meetings and activities.

Team building and staff development activities are a priority, now that the scheme is entering its third semester and the tutor team is expanding. Some of these activities will be grounded in data and documents produced within the scheme: for example, reports of action research undertaken by tutors into key roles within the scheme, participants' programme proposals and Statements. Time has been found to enable potential ALG advisers to observe established advisers in ALG meetings, and for ALG advisers to meet together to share experiences and provide mutual support. Module leaders need to share their experiences of getting modules off the ground, of negotiating module content and delivery with participants and of delivering modules in different modes.

It is also intended to return to basics and for tutors to identify and debate issues and approaches in teacher professional development, drawing on the growing body of teacher development literature (Hargreaves and Fullan 1992), which may offer conceptual frameworks for appraising the PGDip/MEd as a professional development scheme and suggest possible activities which can be developed for use within the scheme (e.g. the writing of collaborative autobiography by members of ALGs). Similarly, literature on collaborative enquiry may help tutors to appraise the delivery of scheme modules and the operation of ALGs - posing questions, for example, about the extent to which the latter have transcended contrived collegiality and developed genuinely collaborative cultures (Little 1990; Hargreaves 1992). An important reason for the success of the scheme in attracting participants is its ethos and vision, and its commitment to process, and these need to be reviewed and reconfirmed as the scheme expands.

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19 Quality horses for quality courses: matching students with courses in music

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INTRODUCTION

Selecting suitable candidates for courses in further and higher education is undoubtedly crucial to the quality of course outcomes and thus the perceived quality of a course. Poor or unsuitable students are as likely as poor teaching provision to undermine the evaluation of a course's quality. While we may have little control over the quality, academic or otherwise, of those who present themselves as prospective students, nonetheless, the responsibility for deciding upon what are quality students and selecting them remains ours. In the cycle of educational activities and thus of quality procedures, student recruitment and interview marks a decisive point. Misjudged selection or mismatching of courses and students may make any further evaluations of course quality redundant. In this paper I wish to argue that:

1. the perception of course quality is individual as well as general; students' involvement with quality assurance procedures starts with course advising which should be seen as a case of matching rather than selecting
2. the conditions of adult and continuing education offer examples of client-sensitive course advising, the analysis of which can offer insight into how student-based quality procedures may work and thus be improved
3. like any other aspect of a service, course advising needs clearly defined procedures but also requires the application of "intuition" to be sensitive to the interpretation and judgement of individuals and their circumstances; a quality assurance system requires much the same approach if it is to be useful analysing and recommending on the particular as well as the general.

ASSESSING STUDENT SUITABILITY

In the cycle of course design, planning, teaching and assessment we, as providers of courses, have some direct control and thus responsibility for ensuring quality in terms of "fitness for purpose". If the fitness for purpose of a course can be measured by its ability to graduate students who, as a consequence of the course:

- maintain attendance and do not "drop out"
- achieve high examination marks
- perform well
- find employment quickly and maintain it satisfactorily
- obtain personal satisfaction
- acquire deeper knowledge and appreciation of subject
- are motivated and equipped to pursue further study

then we attempt to choose those students who we feel have the potential to last the course and achieve well in relation to these outcomes. However, we often have no more sophisticated an instrument for assessing student suitability to study than the absorption of a body of knowledge and the ability to pass examinations; we often judge and admit students to further and higher education on the basis of GCSE or A level examination

results even without seeing or interviewing them (Ramsden 1986).

When a course is designed to provide for a clearly specified need, in the way of specific training rather than a general educational aim, it is not difficult to formulate a model of the kind of person suitable for such a course and potentially able to fulfil its originating purpose. If you want to train an orchestral musician, for instance, you select a competent player, with good sightreading skills, who can blend musically, work well with other players and take direction. As the selector you are the "expert" (Williams 1986). You know the standards required. You have formulated some picture of the ideal orchestral musician, the skills, experiences, knowledge and attitudes which are likely to make not only a potentially good player but also a good student who would benefit from the kind of training that you offer, and you select accordingly. The prospective student's role in this is to accept an offer or reject it - not usually to negotiate the basis upon which it is made. Entry to most further and higher education and training is controlled in this apparently autocratic way. The institution sets the entry standards, the curriculum, and the methods of assessment. However, in the end it is student performance which vindicates or damns institutional provision.

ISSUES OF QUALITY IN MATCHING STUDENTS WITH COURSES

But what is a "quality" student? Are not those who genuinely wish to study, potentially "quality" students? And if there can be unsuitable students for courses, can there not also be unsuitable courses for students? Lack of fit must also be an aspect of lack of fitness for purpose. And while fitness for purpose can address itself to the outcomes of educational provision does it not also incorporate the idea of quality of the means in achieving the ends? Effective initial course advising and consequently better fitted course placement, I argue, is the first step in the student-institution relationship of a quality assurance kind. But only if the student is involved and takes responsibility for quality assurance, as does the institution itself by example. Because the relationship between institution and student is essentially unequal, it requires the institution to invite the student to participate. The recent "market-speak" description of our students as "clients" may indicate not only that institutions see themselves as offering a service, but also that the relationship between student and institution is less paternalistic, and more negotiable in the way of a partnership (Jarvis 1983). The relationship between student and institution as far as quality assurance is concerned must also surely be one of partnership.

The lessons now being learned in the new generation, market-led higher education have probably been encountered by adult continuing education some time ago. Higher and further education could have something to learn from the adult continuing education ethos if not its method. Adult and continuing education (ACE) has traditionally attempted to anticipate or respond to the perceived usually nonvocational needs of the local community based around a concept of personal enrichment or liberal education (Jennings 1981). Students are involved by choice and usually towards no particular extrinsic goal other than the personal satisfaction of involvement, study or learning. However, with ACE moving increasingly into accredited and award-bearing courses preparatory to further and higher education or continuing professional development, teaching and learning is becoming as goal-oriented as that within further and higher education (FHE).

The greatest contrasts between liberal ACE and qualification seeking FHE-type courses would be in the more obvious autonomy and agency in their education that students have in ACE (see Jarvis 1985). ACE students are used to paying directly out of their own pockets for their courses and thus they often feel as if they have greater control over how

they are taught. They may also have a hand in proposing or designing what they learn along community education lines (Allen et al 1987). And in my own experience of AE teaching I have more than once felt the need to alter my course plan if it has seemed inappropriate to the requirements of the majority of students or lose the course altogether. These students support what they feel to be good courses by "voting with their feet". They can walk right out again if it is not to their liking, and as students used to making moves for themselves they are less hesitant about demanding their money's worth in the way of adequate resources and relevant and effective teaching. The point is that adult education students tend primarily to select their courses rather than being selected for them, and because of their relative autonomy, their support or lack of it is a potent indicator of the quality of a course certainly from the student' perspective.

The apparent autonomy of the ACE student makes for a dangerous life in adult continuing education planning but sharpens the mind to quality issues. When students abandon ACE courses in large numbers the course closes but this loss alerts you to a possible quality problem. When you lose a few individuals you may never see them again. The trouble is that issues of quality or lack of it often surface when it is too late. The usual student contribution to course quality assurance is the course evaluation questionnaire handed out towards the end of a course. While they can provide very useful suggestions to the fine tuning of quality course provision, the answers are fairly predictable because favourable evaluations tend to come from those who are satisfied enough to stay the course. The most telling evaluations I would suggest come from those who leave before the end, as this brief report may illustrate.

To give background to a quality evaluation exercise within the music programme in the Department of Continuing and Community Education, Goldsmiths' College, an enquiry was made into the reasons why students dropped out of four music classes. Tutor permission is needed to enrol for all these classes and course advice is available. Some figures briefly describe the results:

Course:	(A)	(B)	(C)	(D)	Total
Enroled numbers:	15	18	12	12	57
Left early:	4	4	1	0	9
Reasons for leaving course:					
-domestic or employment commitments:			3		
-travel problems:			1		
-course level too demanding:			2 (1 found another DCCE course)		
-course level not demanding enough:			2 (2 found another DCCE course)		
-course not quite what was expected:			1 ("realised course would need some commitment")		

These figures in themselves are not significant and certainly on the basis of the sample not generalisable to the whole music programme which caters for approximately 800 students. What is important to me at least is the fact that out of nine ex-students five left because of issues to do with the quality of the course. Although three subsequently received course advice and found another DCCE course, two out of the five slipped through, did not take advantage of the course advice service at all and left the DCCE music programme altogether. While student perceptions are important indicators of the quality in terms of teaching effectiveness and communication, institutions and the teachers and "experts" that constitute them have the ultimate responsibility for determining the relevance and content of what is taught and thus the quality of overall provision.

For students to assume some of the responsibility for the quality of their education they need to be involved on a personal level and they also need to feel that they are receiving

personal attention. Students feel more inclined to ask your advice if they know your name and face, though from my own point of view this kind of input to quality is a double-edged sword. More informative prospectuses and precise course descriptions help, but experience shows that face-to-face course advice is what prospective students are after. Many of you will recognise the situation where the answer you are giving to a telephone enquiry is exactly that given by the prospectus held in the hand of the enquirer at the other end of line!

ENHANCING THE QUALITY OF COURSE ADVISING

There's a saying that if you wish to learn about something you should teach it. In teaching some classes on course advising on the newly-launched Certificate in Music Teaching to Adults course, I became aware of the value not only of having clear course advising procedures but also of the use of "intuition" in applying them. I became more explicitly aware of this in having to engage my students in simulated student-course advising activities in the way of role play. Here is an example of a role play question:

> "You are about to retire and you will now have time to devote to learning music. You own a number of chord organs and electronic keyboards and have taught yourself to play by 'fiddling about'. You now feel that it's time to learn to play 'properly'."

One student takes the role of the prospective student and the other the role of the course adviser.

While it was not too difficult to coach or point out to my students the general lines of enquiry to be made, or even in what manner questions could be fielded, unanticipated answers were received which they were nevertheless able to respond to when prompted or led. We also framed the same role play game into the form of questions submitted to an adviser and requiring a written reply. My 14 students gave some very individual answers to the same question, despite making a generally similar analysis in class after the activity had been done of the information needed by the counsellor and prospective student. The class answers were analysed against my own answer given as the "expert".

At the start of this particular class, the quality of the advising done by the students was surprisingly variable. However, once presented with a system in the way of a checklist of questions, there was noticeable improvement all round with the questioning being less haphazard and the process taking a shorter time to reach some conclusion. Here is a somewhat abbreviated form of the procedures used in the course advising training sessions described above:

1 Find out what and why the student wants to study and preparedness for study
   - by direct questioning
   - by indirect questioning
   - by audition
   - by examining portfolio
   - by diagnostic test

   What you need to know about the prospective student
   - Musical interests
   - Musical experience, if any
   - Music educational background, if any
   - Reasons for study
   - Level of seriousness, commitment to study
   - Appropriate home study or practice support/instrument

- Other commitments - family/employment

2 Suggest suitable course(s) or programme of study
- programme prospectus
- course descriptions

What you yourself need to know
- Scope of music programme on offer
- Entry requirements, content and level of individual courses
- Other courses which your own programme accesses
- Musical activities and experiences to which your courses can contribute
- Further study in music
- Employment opportunities in music

What in general you must have
- A wide knowledge of musical genres, styles and practices and the kinds of skills, knowledge and attitudes that are part of these musical traditions
- An ability to listen carefully
- A genuine interest in placing prospective students within suitable courses
- An ability to analyse suitable levels of musical knowledge and experience allied with a scheme of progressed instruction in music

3a) If suitable course(s) found
- outline course commitments and expectations, agree them, and ask if there are any further queries

3b) If no suitable course(s) found
- suggest further lines of enquiry or other advisers

While it was not to difficult to spell out the general kinds of questions an adviser could field, the particularity of responses require a flexible approach. There seemed to be times when the checklist had to be abandoned or not followed in an evidently systematic way.

THE PLACE OF INTUITION

Earlier I proposed the notion of the use of "intuition" in advising prospective students. The way that it is used here is to do with openmindedly interpreting and making a "creative" guess or suggestion about a particular situation or set of circumstances you may not have encountered before. I would suggest that what I call "intuition" in this context is not just a flash of insight coming from nowhere and without antecedent or preparation. The basis of intuition is often unfathomable at the time but an aspect of what has been called "tacit knowledge" or of knowing more than you can tell (Polanyi 1966).

You apply intuition when you creatively and imaginatively manipulate your own knowledge and experience to solve a problem that is new to you or has unique circumstances, often when formal systems or procedures cannot give guidance. Intuition may have an unarticulated basis, it may also be "untidy" in the way that it operates, but is flexible, sympathetic to the particular, and thus personal. Because of this, I would advocate that intuition is an important part of human interaction. If we are evaluating other human beings and their experience and potential as we inevitably do as teachers and educators then to be fair we need to remember that we apply both systematic procedures and intuition.

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20 Recognising quality in engineering education

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INTRODUCTION

Quality can only be considered when both the purpose of education and the course design features associated with its attainment have been absorbed. This paper considers both elements with regard to engineering education at degree level. The course features are considered from the perspective of what the students should be experiencing rather than how the academic is performing.

Quality of higher education is commonly expressed in terms of the teacher's performance. End of course questionnaires handed out to students often require comment upon the clarity of overhead projection transparencies, quality of handouts and whether lectures started and finished on time. This seems to miss the point somewhat; after all, learning is something which learners do, rather than something which is done to them. It would be more productive, if more difficult, to assess how well our efforts helped the students to learn.

We shall take the definition of "quality" to be fitness for purpose. This begs the question as to what is the purpose of an engineering education? A universal answer is that we aim to improve the quality of thinking of our students. This has been elaborated (Hawkins et al 1965), within an engineering context, by the American Society for Engineering Education (ASEE) to be:

- mastery of the fundamental scientific principles and a command of the basic knowledge underlying a branch of engineering, and
- thorough understanding of the engineering method and elementary competence in its application.

This paper explores two questions:

1. What are the components of the "engineering method"?
2. How would students recognise that they were on a quality course which allowed them to develop skills in using the engineering method?

It is not our intention to discuss different teaching methodologies but rather their characteristics by which quality may be judged.

WHAT ARE THE COMPONENTS OF THE ENGINEERING METHOD?

In engineering we wish students to recognise that there is not a single correct solution to most problems. Hence, participants at the workshop defined the engineering method as a process of design to produce a workable solution within constraints imposed by society. Although intellectual skills are involved it is important to recognise that the products of engineering are implemented through people. Hence, two sets of skills are required.

Intellectual skills of creativity, analysis, synthesis and evaluation allow understanding

and manipulation of knowledge. Problems may thus be solved and effective decisions made. In doing so, deficiencies of knowledge and understanding will be recognised and strategies to overcome them implemented.

Engineers work in teams and require an awareness of group processes and a repertoire of appropriate skills. Harrisberger (1984) claims the working day comprises 80% -ings", namely planning, communicating, listening, persuading, discussing, informing, leading, delegating, managing etc. The various intellectual skills may also be included in this grouping. It is also important that young engineers develop a self-awareness of their strengths and weaknesses.

The remaining part of the day is taken up with the "-ics" - physics, hydraulics, electronics, mathematics etc. These form the first of the two ASEE goals. Whilst higher education may not feel that an 80/20 split is appropriate for degree courses, it is undeniable that the current balance is heavily weighted the other way.

What is immediately apparent is that the passive receipt of information from a lecture is inadequate to develop skills in the engineering method. The University of Bradford's mission statement is "Making Knowledge Work". This implies movement and effort. Thus, students must be actively involved in their own education. It is also apparent that a reductionist view of engineering is inappropriate. Engineering is a complex whole with which students must be confronted, not only within a single topic but also across the complete discipline.

HOW WOULD STUDENTS RECOGNISE QUALITY?

If we wish to improve students' thinking it is first necessary to ask how they approach their learning. Research suggests that students adopt either a surface or a deep approach to learning. This is largely a conscious intention dictated by circumstances. The surface approach is characterised by focussing on the details and information in a learning environment. Learning is by memorising facts in a linear manner with no interpretation. In contrast, students adopting a deep approach focus on the meaning of the information presented to them. They will relate facts, possibly to their own experiences, to develop a coherent picture. It is obviously the latter approach which we should encourage and which is implicit in our definition of the engineering method. It is unfortunate to note the evidence suggests that it is the surface approach which is all too common in HE (Gibbs 1992).

Four characteristics of course design and delivery have been identified which are associated with the deep approach to learning:

- learner activity
- student interaction
- a well structured knowledge base
- motivational context

We have already identified that the engineering method requires active involvement in the learning process. Activity is not enough; it must be planned and time allowed for reflection upon the learning so that it may be integrated with existing concepts, knowledge and experience. One of the key features which drives students to the surface approach is a heavy workload which does not allow the time for reflection. This must be resisted, whatever the demands from professional institutions for more and more content. Proficiency in engineering comes from method or process, not facts.

Not only is the active involvement of other students necessary for the "-ings" but also

for clarifying concepts. Learning is more profound if the subject matter is discussed, chewed over or presented. After all, the best way to learn something is to have to teach it. There are profound implications for the architecture of HE institutions. With the dominant delivery mechanism in engineering degrees being the lecture we are reasonably equipped with raked lecture theatres. These are of little use for small group discussions etc. Flat floored rooms with moveable furniture, socialising areas and the like will promote human interaction. Arrangements for laboratory classes need to flexible, and the technical support staff kept informed, so that the students have access when required, not when timetabled. Library staff need to be kept informed and involved in developments so that they can ensure that the necessary support is available. Similarly, support for computer hardware and software needs to be available to support the learning.

The engineering method requires an holistic approach to design which also aids the deep approach to learning. However, the structure of knowledge and its inter-relationship with other knowledge and concepts must be clear to students. We have found that problems directly imported from industry, whilst true to life, can contain ambiguities or avenues which detract from the required learning experience. The use of such problems provides the context in which learning is motivated. Students recognise a need to know for themselves and experience ownership of the learning. It is incumbent on the academics to provide an open and supportive environment for the students to experiment, question, make mistakes and develop.

High level skills take time to develop. Thus, high class contact and excessive course material should be avoided to create the appropriate learning environment for the engineering method to be refined. Additionally, a lack of choice of subjects learned and little opportunity to study a subject in depth reinforce the tendency to adopt the surface rather than deep approach.

These features should be associated with the complete course from start to finish. The temptation to say "Let's get the basics into them in the first two years and then ease off in the final year and do all this experimental stuff" has to be avoided. Students have an open mind as to what HE is when they first walk through the door. That is the time to set the academic agenda, which, once set, will become the accepted norm. Confusion and anxiety will be the result of changing for the last year and a surface approach will be the inevitable result.

CONCLUSIONS

We have identified several features of degree courses which should be in place in order for students to adopt both a deep approach to learning and follow the engineering method. Indeed, the two are inextricably linked. A quality course should be judged against these criteria rather than simplistic measures of lecturing performance.

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Section 4: Quality in Learning and Assessment

The theme that runs through all the papers in this section is that the quality of learning and assessment is enhanced when learners themselves are taken seriously: when they are helped to understand how they learn, when their preferences for and reactions to different learning strategies are acknowledged, when they are empowered to take ownership of their own learning and assessment, when they are seen as partners in evaluating the quality of learning outcomes. Among the papers in this section are two workshop reports which describe the activities completed, activities which were designed to draw on the collective experience of participants in generating useful insights and products.

Dave Müller and Peter Funnell argue in their keynote paper, "Exploring learners' perceptions of quality", that quality requires the learner to be at the centre of both the learning process and the process by which such learning is evaluated. They make a compelling case for obtaining regular qualitative feedback from learners, indicate how this process is closer to the tenets of total quality management and can have an immediate impact on the quality of individual learning, and identify implications for teaching and learning strategies. Although the context is vocational education and training, their insights have general applicability in the search for quality in learning and assessment.

"Concept mapping, post-questioning and feedback in distance education", by **Robert M Bernard, Som Naidu and Karin Lundgren-Cayrol**, presents the findings of a field experiment to compare the strengths and weaknesses of mathemagenic (eg. post-questioning) versus generative (eg. concept mapping) instructional strategies. A significant difference in cognitive gains by nursing students who completed at least 11 of 12 concept mapping exercises was found. It was also found that feedback is a key element for instructional gain in both strategies. The paper also discusses students' preferences for and reactions to different learning strategies.

The next two papers address different but complementary themes in the context of workplace-based learning. **Caroline Bucklow** in "Comparing chalk and cheese - quality in assessing work-based learning", outlines a workshop designed to enable participants to identify priority issues in, and build quality into, the process of assessing students' workplace-based learning. The workshop is written up in a form that enables it to be replicated as a staff development activity for course teams. "Using learning contracts to enhance the quality of work-based learning", by **Iain Marshall and Margaret Mill**, describes a strategy for involving learners in negotiating learning plans and goals that are responsive to their needs, and also in negotiating what is to count as evidence that learning outcomes have been achieved. They also show that the accreditation of workplace-based learning can be cost effective in terms of staff time.

In "Quality of assessment", **Phil Race** identifies four main processes of learning and shows how traditional assessment methods are at cross purposes with them. He discusses ten "worries" about assessment, and makes suggestions for avoiding the problems associated with each of them. Practical ideas for improving assessment are illustrated, with emphasis on self- and peer-assessment strategies which enable learners to take ownership of and learn through the process. In "BS5750 for assessment" he presents the products of the workshop associated with his paper, in which participants consider the fitness for purpose of different forms of assessment, review their own experiences of being assessed, and "lay down the law" by identifying criteria for quality in assessment.

21 Exploring learners' perceptions of quality

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INTRODUCTION

In response to the needs of external funding agencies and in order to provide information for managers of education and training institutions, considerable emphasis has been placed in recent years on the collection of quantitative learner feedback in the form of questionnaires. This data has often been used to support course evaluation processes and contribute to the creation of institutional performance indicators. It would not be unreasonable to suggest that those of us with responsibility for the management and delivery of vocational education and training have been subject to much tighter control than those engaged in academic education and research or the delivery of the traditional sixth form work. The Department of Employment, in particular, has placed emphasis upon data driven planning and the evaluation of the effectiveness of vocational education and training through the use of employer and learner feedback using questionnaire methods.

However, in exploring "quality" in the context of vocational education and training, we have found ourselves focusing on qualitative issues. In our first work in this field (Müller and Funnell 1991a) we explored quality from the perspective of learners, employers and as a managerial issue. We became committed to "total quality management" as referred to by leaders in the field (such as Oakland 1989a, 1989b) both as a concept and as a form of operational practice. In subsequent papers (Müller and Funnell 1991b, 1992a 1992b) a total quality approach to managing vocational education and training was put forward emphasising the centrality of the learner in the learning process.

Nevertheless, it has become clear to us that a managerial commitment, however important it is, is not the sole prerequisite to a move towards total quality management. Indeed we now believe that to be faithful to the major tenets of the total quality approach we need to consider the extent to which we are really close to our customers. Put simply it now seems to us that in following the total quality approach we need not only to commit ourselves as educational and training managers to a customer orientated approach but also recognise that we need also to explore the perceptions of our customers through their own eyes. This paper sets a framework from within which we seek to achieve this.

WHAT IS QUALITY?

There are clearly multiple and varied definitions of quality as applied to vocational education and training and multiple definers of the concept. We have sought to argue against a competence based approach which suggests that quality is delivering a product which is "fit for purpose". Rather, we have explored quality in terms of a wider range of factors leading to a notion of "value-addedness". We consider it important that the notion of quality be defined in terms of the longer term impact vocational education and training will have on the learner. In exploring quality from this perspective we have argued that the role of educational providers is to ensure:

> "that learners fully participate in, and contribute to, the learning process in such a way that they become responsible for creating, delivering and evaluating the product." (Müller and Funnell 1991a, p 175)

Following a detailed review of the literature and the exploration of a number of case studies, we have proposed five defining criteria which contribute to the delivery of quality vocational education (Müller and Funnell 1991a). All of these focus specifically on the learner and the role which he or she plays in determining the product:

a) quality recognises the centrality of the learner in obtaining successful learning outcomes;
b) to some extent the learner must take ownership of the learning process;
c) the learner has some responsibility for determining the style and mode of delivery of learning;
d) learners participate outside the formal learning context to the process of learning;
e) learners innovate, experiment and learn from failure as well as success, a notion which challenges the concept of "zero defect" prevalent in total quality management.

The conclusions we have come to have been derived from a managerial focused approach to investigating quality. The case studies we have employed in our own work have tended to reflect different approaches to managing the delivery of education and training and highlight good educational practice. However it was left to Barnett (1991) to articulate more precisely the limitations of numerical performance indicators and the need to place the learner at the centre of the educational institution as a whole. He proposed:

> "What we need, in short, are indicators that a concern for the quality of student learning is built into the internal life of the institution. In the previous section, I gave some examples of what these might be. If we find an institution which has instituted learning weeks, has a staff development unit concerned about student learning and the student experience, gives tangible rewards for high quality teaching, clearly looks to evidence of the commitment to teaching in its promotions procedures, picks out examples of good teaching in its newsletter, and encourages staff to explore teaching and learning intentions within its course review procedures, then we have grounds for believing that here is an institution in which the character of the student experience really matters and is not just a piece of rhetoric" (p 50).

There remains, however, a need to go beyond this and to recognise that organisations through managerial approaches alone cannot place the learner at the heart of the process without ensuring that the tutor has fundamental devolved responsibility for creating the product in partnership with the learner. We now believe that it is essential to place the learner at the centre of the evaluation of learning processes and outcomes by focusing on qualitative approaches to exploring learners' perceptions of quality. To achieve this the responsibility for evaluation must be built in to the learning process itself and be owned, in partnership, by learners and tutors. The rest of this paper will explore some first steps in fulfilling this commitment to identify and act upon learners' perceptions of quality.

EVALUATING QUALITY

To date the major rationale for exploring and evaluating quality from the perspective of learners has been to provide information for curriculum managers and those with broader institutional responsibilities. This has also included external validating bodies and in particular the Council for National Academic Awards (CNAA) which has placed particular emphasis on the course review process. In further education, those external agencies with responsibility for funding have required the collation of student feedback

data, which impacted more upon the political context within which vocational education was funded rather than the actual experience of the learner. Nevertheless, there have been a number of well tried and tested approaches to evaluating quality all of which have been primarily concerned with providing information to be used by others in designing the curriculum and in the planning of vocational education. It is notable that a great deal of the data collected has been retrospective and has been of greater benefit to future generations of learners rather than current learners.

Quantitative Approaches

The questionnaire approach has long been dominant in vocational education and training as the means of obtaining feedback from learners. There are many quite sophisticated questionnaires developed both in the UK and elsewhere (Bedford LEA 1989; County of Avon 1989; and Thomson 1988). The basis for quantifying learners' perceptions of quality is usually through some means of scaling. For example, a paper by Okun et al (1986) reported on the development of a psychometric approach to investigating USA College students' affective reactions to their academic lives. Students were asked how they feel about major areas such as the classes they are taking, what they are learning, their instructors and what is available to them in the way of services, guidance and assistance. The response options were "delighted, pleased, mostly satisfied, mixed (both equally satisfied and dissatisfied), mostly dissatisfied, unhappy and terrible." Data of this kind can be valuable in that it offers quantitative feedback to tutors whilst collectively providing an overall evaluation of the learning environment.

The need to collate feedback gathered through questionnaires has led to a number of highly sophisticated commercial systems coming on the market. ScanTech Systems Ltd, Dunstable, UK, are promoting a means of collecting and collating questionnaire responses which captures data and processes it for presentation in graphical and tabular formats. The information provided is of high standard and is readily available to those with front-line curriculum responsibility as well as to institutional managers. The kinds of areas explored are not dissimilar to other questionnaire approaches. For example, students are asked for their views on college facilities such as buildings and the refectory and on course/programme content and teaching, and response options are very good, good, below standard and poor. The use of such systems can be invaluable if the major emphasis is to be placed upon generalised data and a broader approach to evaluating learners' perceptions of quality. However, it is important to recognise that learners are not in ownership of this information nor is it built in as an integrated part of the learning process.

Qualitative Approaches

Simultaneously with the preparation of this paper, the proceedings of a recently convened CNAA conference on "Evaluating the Quality of the Student Experience" were published (Burrows 1992). A major theme emerging from the conference has been the need to place the student more at the centre of the evaluation process. A number of the papers argued that giving students more autonomy and greater responsibility within a quality assurance system must be seen as part of the educational process itself, and that greater emphasis should be placed on the need to develop a dialogue between students and tutors. Clearly in this context the quantitative, questionnaire derived, approach fails to place ownership with the learner or create a dialogue which is in itself customer orientated. Interestingly whilst a number of the papers presented explored qualitative rather than

quantitative approaches to gaining feedback (eg. Baldwin and Carter 1992) it was a student contribution which argued the case for building self and course assessment into the programme of study itself (Rostron 1992).

In our view qualitative approaches to learners' perceptions of quality are closer to the basic principles of total quality management and should have a greater impact upon the teaching and learning process. From a managerial perspective the total quality movement places particular emphasis on getting as close as possible to the customer and on building quality in to the production process rather than excluding deficient products at the end. If we apply this to vocational education and training, and recognise that the learner is both customer and product, the need to find means of building quality into the learning process becomes self evident.

Those closest to learners are either fellow learners (eg. those following the same programme of study) or those with teaching responsibilities. In our view qualitative approaches need to bring together learners and tutors in such a way that their explorations of the learning process can have an immediate impact upon the curriculum. At the heart of vocational education and training lies individuals with shared responsibility for delivering a quality product in terms of a qualified learner outcome and a well developed curriculum process. The encouragement of learners to share with tutors the ways in which the process is developing can be seen to be of greater value than the retrospective recording of quantitative data which may or may not be acted on by managers. We believe that it is necessary to give greater currency to the constructive dialogues which learners and tutors have and to build this into the process of learning through devolving responsibility to those who have the knowledge to transform the product at its formative stage.

IMPLICATIONS FOR TEACHING AND LEARNING STRATEGIES

In placing greater emphasis on regular qualitative feedback the process of teaching and learning is likely to become influenced in different ways. There are immediate implications both for learners and their tutors in coping with the responsibility of managing their own curriculum. Many of these issues need greater exploration and it is our intention to confront some of these during the next phase of our own work, which will be an empirical investigation of learners' perceptions of quality. However, it is important to identify some of these issues and challenges at this stage:

a) A major challenge will be the devising of means to support and teach learners how to evaluate quality. This will require both objective explorations of learners' perceptions of quality as well as an analytical approach to curriculum design by tutors.
b) Learners will need support in understanding their own role in constructing the products of vocational education and training. This is a particularly difficult concept to grasp in the context of a customer purchasing a product from a provider. Rarely, as purchasers, do customers have to participate in creating the product they are buying.
c) Evaluation will need to become part of the teaching and learning programme. By this means qualitative evaluation will become integral to the delivery of the curriculum and will not be simply an adjunct to it. This too will challenge many existing assumptions about the nature of curriculum design and the resource allocated to traditional teaching.

d) There will be a need to formalise in a constructive, and non-threatening and non-bureaucratic, manner the ways in which learners and tutors talk about the curriculum and learning processes. It is a common assumption that good interpersonal relationships between tutors and learners is an insufficient condition for quality assurance procedures. In our view this assumption needs to be challenged. Indeed in the process of challenging this assumption we may find that for too long we have ignored good practice in this area.

e) There may emerge a need to give greater importance to peer review. Learners are often the best judge of the curriculum and its delivery, and if engaged not only in the process of comment but in taking action, are likely to recognise issues and to respond positively to them.

f) Finally, qualitative evaluation without action is of no value. We will need to explore and encourage learners and tutors to evolve informed strategies and to take actions. Responsibility through constructive conversations will be shared and should lead to a more sophisticated approach to the delivery of quality in vocational education and training.

THE CHALLENGE - REALISM OR RHETORIC?

Concerns have been expressed that the "language" of qualitative approaches to evaluation is both derived from, and only appropriate to, higher education. We feel uncomfortable with this argument. Clearly it is important to recognise the different needs, and skill and experience bases, of the consumers of vocational education and training. However it is our view that all learners can be empowered to take responsibility for their own learning. Indeed there are excellent examples of this operating in the compulsory education system where one of the major strengths of the educational process is the partnership which has emerged between parents, pupils and their teachers.

Clearly there is an idealism here. However at a practical level few of us with experience of working in vocational education and training are unable to engage young trainees or returning adults in conversations about their hopes, plans and current learning experiences. Increasingly, the narrow views of teaching specific skills which lead to competence without capability, is coming under critical attack (Marshall 1991). Few of us would disagree that we want learners who are both competent and capable and, whatever the teaching methods employed, that we need to develop entrepreneurial and leadership skills. All work situations in the end require the individual to make decisions. The starting point is placing some ownership for learning with all of those fully integrated and engaged with the educational system. What can be forgotten is that the young trainee of today is the mature learner of tomorrow, complete with family and community responsibilities. Life teaches us how to make decisions and to own challenges, opportunities and problems. We must be wary as educators of failing to recognise the power of the education process itself in supporting this.

THE NEXT STAGE

As part of our own process of learning and teaching about quality we are now planning to mount a series of empirical studies into qualitative approaches to investigating learners' perceptions of quality. It is our intention to collect data and to work with colleagues in the more traditional areas of further and vocational education. We have plans to try and compare both craft and technician courses as well as mature and younger learners. As part of this empirical exercise we wish to bring together the learner and the tutor with a

view to empowering both partners not only to evaluate quality but to improve it. We also hope to demonstrate that the emphasis we have placed on learners owning the product is appropriate and in doing so to be able to support the tenets of the total quality approach to vocational education and training. In summary, we believe that:

a) it is important for tutors to get close to the learner and hence the product;
b) for quality to be built in to this process; and
c) to encourage the learner and the tutor to take responsibility for constant improvement.

This will legitimise the place of the learner at the centre of the evaluation process, and is in line with the theoretical principles derived from the total quality approach. As such it places responsibility on learners and their tutors for identifying the factors which determine quality and for acting upon them.

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22 Concept mapping, post-questioning and feedback in distance education

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INTRODUCTION

The aim of this paper is to disseminate findings from a field experiment in a Distance Education setting, where the main goal was to compare mathemagenic and generative instructional strategies for cognitive gain on both a short term and a long term basis. A secondary goal was to look at students' preferences of learning style, and willingness to acquire a new strategy. Mathemagenic and generative learning strategies are here defined according to Rothkop (1970) and Jonassen (1985). Mathemagenic strategies refer to instructor imposed activities which direct the learner to the basic content of the text (ie. inserted or post-questioning techniques, behavioral objectives, advance organizers etc.) as opposed to generative learning strategies, where the learner creates his/her own representation of the content (eg. concept-mapping, note-taking, elaborations etc.).

It has been argued that mathemagenic devices are efficient time-wise in guiding the student to specified content (Hamaker 1986). However, it has also been revealed that students in distance education settings appear to skip these devices, unless they see an immediate benefit. Therefore, this method might be less effective in terms of recall on a long term basis (Clyde et al 1983; Marland et al 1990).

On the other hand, generative learning strategies, such as concept mapping and note-taking, are aimed at activating students to build on their previous knowledge and construct a meaningful graphical and/or conceptual representation of the material to be learned. Essentially, generative methods activate intellectual capabilities, such as the ability to make observations through the use of inference (ie. to synthesize, predict and explain events), thus moving beyond rote-learning and hopefully promoting meaningful and reflective learning (Ausubel, discussed in Novak and Gowin 1984).

A survey of the literature provided the following points as guidelines for the hypotheses tested in this study:

- although attrition is usually high, some students tend to learn generative strategies with more ease than others; they either do not have a workable strategy (Novak and Gowin 1984; Clark 1990; Dean and Kulhavey 1981) or they have a preference for visual aids in learning (Feldsine 1987; Okebukola and Jegede 1988);

- students being presented with mathemagenic strategies tend to learn basic content as well as students being presented with generative strategies (Novak and Gowin 1984; Miccinati 1988);

- students using generative learning strategies tend to do better on conceptually hierarchical content (eg. biology) once the strategy is well practised, than students being presented with mathemagenic learning devices (Moreira 1977; Dean and Kulhavey 1981; Novak 1990; Feldsine 1987; Schmid & Telaro 1990).

METHOD

Design, Subjects and Procedure

This study was carried out through the Department of Nursing at St Xavier University in Antigonish, Nova Scotia, giving Nursing 200: Community Mental Health as a distance education course in a four year programme. The participants were 141 female nursing students in an obligatory 20 week distance education course, consisting of weekly assignments, a midterm and a final exam.

The midterm and final exams were the dependent measures (DV). Both dependent measures were separated into a set of multiple choice questions, and a set of essay questions broken down into key-idea and related-idea units, both including mapping versus non-mapping items. This technique produced five midterm and five final measures - 10 dependent measures in all.

Treatment groups were assigned to geographical clusters, keeping the largest group for the concept-mapping condition, because of the expected attrition from this condition. Distribution of subjects was as follows: the control group having post-questions without feedback (n = 22); the post-questions with feedback condition (n = 36); the combined group (questions and mapping exercises) (n = 32); and the concept mapping with feedback condition (n = 50). The concept-mapping group naturally separated itself into high persistent mappers (n = 22; M=11 maps; SD=1.5) and low persistent mappers (n = 28; M=3.5 maps, SD=1.6). This bifurcation was used for statistical analyses and is discussed in depth elsewhere (Bernard and Naidu 1992).

Materials

All students received the same instructional package, with an additional study guide that differed according to the instructional strategy employed for that treatment condition.

Control Group

The control group received self-assessed tests with no feedback at the end of each module, which was the normal procedure.

Post-Questions with Feedback

This group received the same self-assessed tests as the control group, but got feedback on 12 of the 20 occasions.

The Combined Group

This group received the same training guide as the concept mapping group and the same self-assessed tests as the two other groups. They were recommended to do 6 maps with feedback and 6 self-assessed tests with feedback.

Concept Mapping

A training guide on concept mapping was provided. Students were encouraged to

construct 12 maps during the course of the treatment, and received feedback on each map completed.

Attitude Questionnaires

All students received a questionnaire evoking their views of the learning experience, as well as a 5-point Likert type questionnaire consisting of 15 statements eliciting information about their predominant style of studying.

RESULTS

Group Equivalence and Covariate

Group equivalence, including the two concept-mapping groups, was established through an analysis of variance using a combined score from four previous exams ($F(4,135)=.89$, $p > .05$). The covariate was found significant and was used to adjust the means for the 10 cognitive measures, both at the midterm and in the final exam. All scores were converted into z-scores.

Cognitive Measures: Midterm and Final Exams

The omnibus MANCOVA produced a significant main effect for treatment, $F(40,494)=2.13$, $p<0.001$. The Roy-Bargmann stepdown approach was chosen, since the sequence of the tests were of importance (Bernard and Naidu 1992). This approach produced four significant variables. At midterm, multiple choice items $F(4,134)=2.90$, $p<.05$) and key non-mapping items, $F(4,131)=2.82$, $p=.005$ were significant. In the final exam, key-mapping items $F(4,128)=3.97$, $p<.01$ and key non-mapping items $F(4,126)=2.98$, $p=.02$ were significant.

Post-hoc analyses were conducted to determine which groups differed and these results are shown in Figure 22.1. Interestingly, the high persistent concept-mapping group performed significantly lower than all other groups on multiple choice items at midterm. However, in the final exam this difference disappeared. This phenomenon is supported in the literature and could partly be explained by the fact that students find it hard to learn a new strategy, and therefore struggle with the strategy more than the content.

It is worth noting that the post-questions with feedback group performed better than the control group, suggesting that feedback is a beneficial element with both mathemagenic and generative strategies.

Furthermore, a significant difference was revealed in favour of the high persistent concept mappers at both midterm and final exams on key non-mapping items. This suggests that even for non-mapping items these students were enabled to relate more information correctly than students in the other groups. For the key-mapping idea units, the high persistent mappers produced better results than all other groups both at midterm and in the final exam. This implies that recall of main ideas is learned more thoroughly with concept mapping, maybe because students elaborate and spend more time on the material, than when using mathemagenic strategies. Moreover, the combined group outperformed the control group on key mapping items in the final exam, further confirming the idea that concept mapping helps recall for these types of cognitive measures.

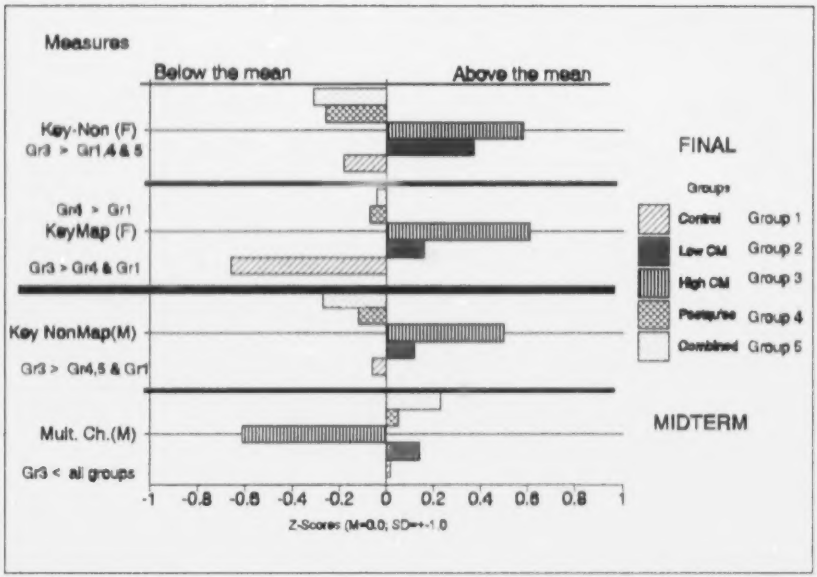

Figure 22.1 *Significant results from the cognitive measures at midterm and final*

Attitudes after Experience

The factor analysis on the study method questionnaire included six factors that together explained 64.8% of the variance. The variance accounted for by each of the six factors is shown in Figure 22.2.

Factor scores (regression approach) were saved and a follow-up analysis revealed a significant main effect for factors, Hotellings $F(20,454)=2.02$, $p<.01$. Univariate contrasts indicated that this difference resides in attitudes between the low and high persister mapping groups ($t=-2.79$, $p<.01$) on Factor 2. None of the other factors or groups produced any significant results. Figure 22.3 demonstrates these findings.

Six questions were constructed to elicit information from all students about their attitudes towards self-assessed tests, since this is a mathemagenic device often used in DE as well as traditional settings. No significant differences were found among groups. However, it is interesting to note that 94% reported to have done most or all of these exercises. Most (83%) verified all the answers, however only 63% reported that they always reviewed incorrect answers, suggesting that post-questions are not always used as intended by the instructional designer. Moreover, 48% of students found them difficult in the beginning compared to 25% at the end. Only 36% found them time-consuming and 67% found them useful to help them study.

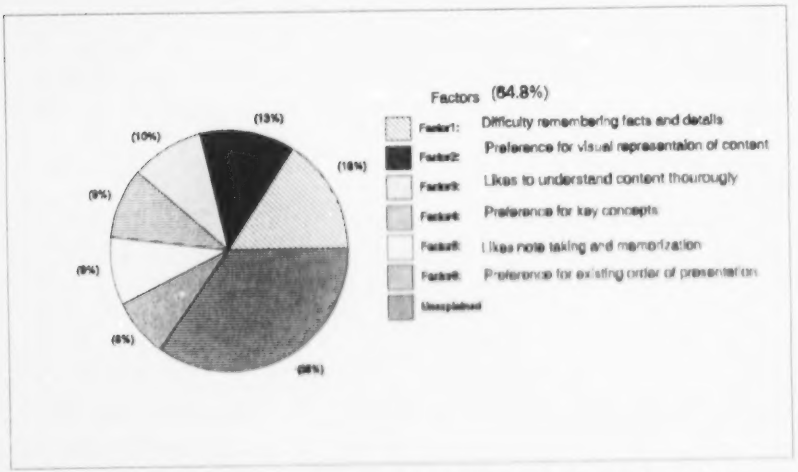

Figure 22.2 *Variance explained by attitude factors about study methods*

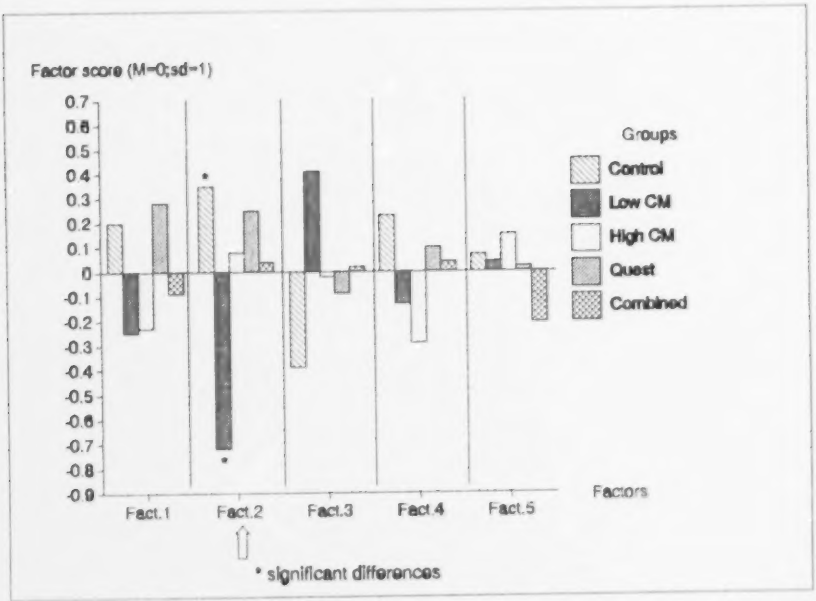

Figure 22.3 *Significant difference between high and low mappers: preference for visual aids in education (factor 2)*

High and Low Mappers

As shown in Figure 22.3 low persistent mappers appear more negatively inclined towards visual and graphical aids in learning new materials.

A closer look at these responses revealed that 65% of the high persisters found maps provided by the instructor useful whereas only 45% of the low persisters thought so. When asked how difficult concept-mapping was at the beginning of the experiment, 62% of the low persisters thought it was very difficult compared to 35% of the high persisters. By the end of the experiment only 20% of the high persisters still reported it difficult, with an encouraging 45% reporting concept mapping as quite easy.

The questionnaire also indicated that most low persisters found the exercises "very difficult to do" (62%), "very time-consuming" (83%) and "not very useful"(75%), whereas the high persisters still found them "difficult" (35%) and "time-consuming" (45%). However, 50% of the high persisters reported that they thought of them as a useful aid in learning new material compared to only 25% of the low persisters. When asked whether they mostly preferred well tried out approaches to learning, 46% of the low persisters agreed to this compared with 30% of the high persisters, indicating a higher probability of willingness to acquire a new learning strategy.

Questions	Concept Mapping Group: High	Low
Maps by instructor are helpful	65%	45%
Mapping very difficult in beginning of experiment	15%	50%
Mapping easy in end of experiment	45%	--
Mapping is time-consuming	45%	83%
Mapping is useful when learning new material	50%	25%
I mostly prefer well tried out approaches to learning	30%	46%

Table 22.1 *Summary of attitude questions*

DISCUSSION

Perhaps the most important finding in this field experiment is that it is possible to teach distant learners generative learning strategies that are beneficial for cognitive outcomes on a long term basis. It also showed that mathemagenic and generative strategies are beneficial for different types of outcomes, since high concept-mappers performed better at key-idea items, whether they mapped them or not, than all the other groups. No differences were found for multiple choice items at the final exam, suggesting that factual or declarative knowledge can be gained by any strategy, but conceptual and procedural knowledge such as that found in the sciences might be enhanced by concept-mapping as a visual aid in learning (Moreira 1977; Feldsine 1987; Novak 1990; Schmid & Telaro 1990). In this study the mapping exercises were matched to elements in the course that lend themselves to concept-mapping (ie. conceptually hierarchical knowledge as opposed to declarative or fact remembering knowledge, Beukhof 1990). It could be speculated that course content in general consists of both types of knowledge. Its implication for material design might be to analyze content in order to pinpoint these differences.

The other outcome confirms what the literature says (Clark 1990), that all learners do not want to or can not adopt a self-activating, generative strategy. This conclusion is supported by the high attrition rate of 56% in the concept-mapping condition as compared with the mathemagenic conditions (post-questions with feedback and combined group) where no attrition at all was noticed. The results from the attitudinal instruments further demonstrate that the difference for preferences of study methods seem to lie in the fact that some students prefer visual and graphical aids (the high persisters), and a tendency by the low mappers to prefer well tried out approaches. All other factors and groups did not differ.

Since the aim was to examine the distance students' reactions to mathemagenic versus generative learning strategies, it could be concluded that mathemagenic learning methods can adopted by anyone, but that they do not necessarily optimize learning. Beudoin (1990) expresses concern over the dependence that mathemagenic strategies create and contends that distance learners must be helped to develop learner controlled learning strategies. By contrast, a generative learning strategy such as concept-mapping appears desirable in this respect, but has drawbacks when the fact that only some learners were willing to acquire it, however successfully, is considered.

Both in traditional and distance education there is a tendency to view the learner as a reactive rather than a proactive participant in the educational process. Expository learning, mathemagenics (Rothkop 1970), teaching machines/programmed learning (Pressey 1927; Skinner 1958), to mention only a few, are orientations that place emphasis on the constructive-interpretative role of the teacher-designer. There is little doubt that these perspectives are valuable, but they represent only one side of the educational equation. The other side argues that empowering students with a set of learning tools (ie. study skills and strategies) can provide both short term learning gain and long term learning potential (Bruner 1966; Rigney 1978; Weinstein and Meyer 1986). This study contributes to the idea that distance educators can design materials that will improve learners study skills and strategies.

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23 Comparing chalk and cheese - quality in assessing work-based learning

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INTRODUCTION

Assessing industrial placements as an integral part of an undergraduate degree is a contentious issue. It is clear that industrial placements provide students with valuable experiential learning which complements academic study, but the issues relating to assessment of this type of learning are not easy to resolve. What aspects of students' learning can we reasonably assess? Who should perform the assessment? What type of assessment is appropriate? How do you define quality in assessment and how do you ensure it? These are vital issues which affect the significance accorded to assessed workplace-based learning, by students and employers alike.

The process of assessment can be critical in shaping a student's perception of the value of workplace-based learning in relation to academic study. Assessment can increase the credibility the student accords a range of skills developed through workplace-based learning and this can deepen the student's involvement with their own learning process. However, the beneficial results are only achievable if all the parties involved are committed to maintaining quality, both in the learning experiences offered and in the assessment process.

The workshop described in this paper provides an opportunity to explore issues of quality in assessing workplace based learning through the medium of case study. The cases are based on our experience in assessing workplace based learning for students on the BA (Hons) Technical Communication course at Coventry University. The assessment scheme used on the course has been developed in the light of research sponsored by the Training Agency (as it was) and the CNAA. Participants in the workshop undertake two tasks to help develop their own responses to the issues involved in maintaining quality when assessing contrasting industrial placements.

WORKSHOP

The idea for the workshop grew out of discussions among members of the course team for Coventry University's BA (Hons) Technical Communication degree, as they developed the assessment scheme for an industrial placement programme. Although the team was agreed on the need for objective assessment based on measurable outcomes, it was only by engaging in a series of discussions about issues of quality that we were able to agree on an assessment process.

During the discussions it became clear that the assessment process would have to accommodate huge differences in the workplace context of individual industrial placements and in the expectations different organisations had of the students. Additionally, the team recognised that students, academic staff and employers might be looking for different outcomes from the placement and felt it was important that the assessment process would be sensitive to different viewpoints.

The process the team went through is represented, in a concentrated form, in the workshop tasks. The role of the workshop facilitator is similar to that of the Training Agency funded project officer who put together the assessment scheme currently in use on the course. The workshop involves participants in two main tasks. The first task is

to agree on the key quality criteria appropriate to assessing workplace-based learning. The second task is to apply these criteria in developing an assessment scheme based on case studies of student industrial placements. These activities offer an opportunity to explore different aspects of quality in assessment and provide an opportunity to devise different assessment schemes and to see how well they stand up to selected quality criteria.

Task 1 - Identifying Priority Issues in Assessing Workplace-based Learning (30 minutes)

For Task 1 the facilitator is probably best employed helping all the participants to identify with their roles and helping the groups to reach decisions.

Materials

Pieces of card (in three colours), one for each participant
Writing materials

Objectives

By the end of the task participants should have:

- formed syndicate groups for task two
- discussed possible interpretations of quality from the viewpoint of student, industrial mentor/supervisor and academic supervisor
- negotiated a set of quality criteria on which participants can draw for the main task.

The success of the task depends on participants' willingness to engage in role play.

Stage 1 (15 minutes)

Participants are each given a piece of coloured card. The colour of the card indicates the role the participant takes in the discussion. There are three roles; student, academic supervisor, and workplace supervisor/mentor. As far as possible participants should adopt a role to which they are unaccustomed.

Participants form a group with others in the same role.

Individually, the participants list the key features they (as members of their role group) would wish to include in an assessment scheme embodying the principles of quality.

The group members then exchange ideas and decide on a list of 'quality criteria' they wish to include in the assessment process.

Stage 2 (15 minutes)

The participants form new groups. This time each group includes participants representing the three different roles. The task now is to negotiate a set of quality criteria that takes into account the varying concerns and perspectives of the different role groups. The intention here is to highlight the differences of opinion which may exist between the roles and to explore ways of reconciling the different perspectives.

At the end of the allotted time the group must have a set of agreed criteria. Any feature which is unacceptable to one or more of the roles must be modified to meet the original objections or be discarded. These criteria can be displayed on flipchart paper so that the groups can compare their own ideas with those of other groups.

Task 2 - Building Quality into the Assessment Process (45 minutes)

For this task the facilitator will probably need to be available to help the groups focus on the task but should not be tempted to supply solutions to the issues raised.

Materials

Case study material describing three industrial placement situations with contrasting characteristics (for further information about this material, contact the author).
Source material on good practice in assessing workplace learning (see References)
Writing materials
Flipchart paper and pens

Objectives

By the end of the task each syndicate group should have:

- identified key issues to be addressed when applying their agreed quality criteria to diverse workplace learning situations
- decided on some approaches to assessment of workplace learning that meet their own criteria for quality
- summarised their findings on a flip chart in poster format ready for presentation to other syndicate groups

Introduction (15 minutes)

The facilitator introduces the individual cases, drawing attention to particularly idiosyncratic features which might influence the assessment process. The facilitator suggests features that might be brought out in the assessment scheme. These should relate to the quality criteria identified in the first task. For example they might include: setting objective success criteria, encouraging students to develop transferable skills, emphasizing deep learning. The facilitator might provide examples of some approaches used in existing workplace learning programmes. This task includes opportunities for participants to raise questions about the case study material.

Main Activity (30 minutes)

Participants remain in the syndicate groups formed in stage 2 of the first task.

Each group reviews its quality criteria from Task 1 in the light of the need to devise an assessment scheme that will work for each industrial placement described in the case study material.

It is up to the group to decide how to approach the task. Some groups may wish to concentrate on looking at the nature of the assessment process, some may wish to define the appropriate outcomes of the process, some may wish to consider how to record the results of the assessment to implement the quality criteria.

It is not necessary for each group to develop a complete assessment scheme for this task to be successful. Some groups may only be able to reach agreement on the outline principles. Similarly, the case study material should be seen as suggestive of the range of problems that may be encountered by people attempting to devise or implement such schemes. It may be appropriate for workshop participants to draw on examples from their own experiences, either to supplement case study material or in the place of the material.

The group can choose which parts of its deliberations it wishes to share with the other groups.

Syndicate Groups Report Back (20 minutes)

Each group in turn shares its findings with the other groups. The time available will typically be between five and ten minutes for each group, depending on the number of syndicate groups.

Workshop Conclusions (15 minutes)

Each participant in turn is given the opportunity to comment on the success of the workshop from their own perspective. The facilitator may offer general concluding remarks if this is appropriate.

References

Coates H and Wright J (1991) *The Integration of Work Based Learning with Academic Assessment, Guidelines for good practice* Coventry Polytechnic Coventry

24 Using learning contracts to enhance the quality of work-based learning

Iain S Marshall and Margaret L Mill, *Napier University, Edinburgh, EH14 1DJ, UK*

INTRODUCTION

Involving learners in the development of their learning contracts is proving a powerful means of enhancing the quality of learning for undergraduates on sandwich courses, and for employees in small businesses. A learning contract is a formal agreement between the learner, assessor and mentor, about what will be learned, and how that learning will be achieved and assessed.

Quality learning which takes place in sandwich placement, or work experience, is gaining full academic recognition at Napier University (formerly Napier Polytechnic) in Edinburgh, where undergraduates are collaborating with teaching staff and employers to develop learning contracts which earn academic credit towards their degree. The Department of Employment are funding the refining of a student-driven model, which can be used in a variety of institutional contexts (Figure 24.1).

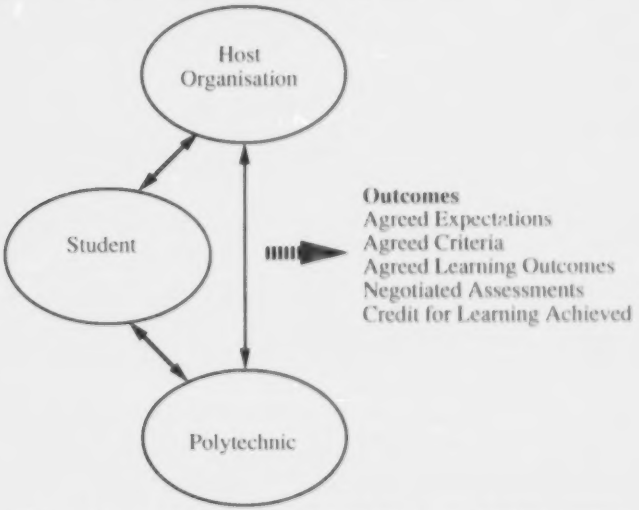

Figure 24.1 *Model of student driven three-way learning contract*

By encouraging the students to take a large measure of responsibility for identifying what they want to learn from the experience of sandwich placements, the motivation of the learner is harnessed to achieving agreed learning outcomes. The model encourages ongoing re-negotiation by all three partners. Students are keen to turn learning which they value into academic credit towards their honours degree.

Academic staff tend to find the focus on the outcomes of learning an alien concept, and this identifies a need for appropriate staff development.

The Napier project involves students in each of the stages identified in Figure 24.2.

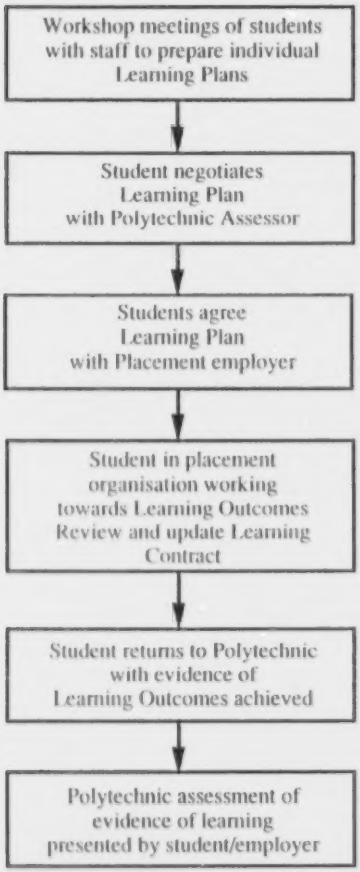
Workshop meetings of students with staff to prepare individual Learning Plans
Student negotiates Learning Plan with Polytechnic Assessor
Students agree Learning Plan with Placement employer
Student in placement organisation working towards Learning Outcomes Review and update Learning Contract
Student returns to Polytechnic with evidence of Learning Outcomes achieved
Polytechnic assessment of evidence of learning presented by student/employer

Figure 24.2 *Model of work-based learning process for students*

Employers of our sandwich students, especially small and medium sized companies, greatly appreciate students negotiating what they hope to learn from placement experience, in advance. It saves time and money by avoiding inappropriate matching of student and placement. Students are glad to have the chance to turn relevant learning from experience, into real academic credit towards their degree.

Of course, this approach raises a whole range of staff development issues for the university, as it shifts the role relationship between staff and student, towards greater learner autonomy. However, a possible bonus to the academic institution is to legitimately shorten the overall length of a course, by offering academic credit for a previously "dead" period.

There are three good reasons why systems and procedures must be developed, which allow students to earn credit which counts towards their degree, from work-based learning:

- In academic institutions there is a distinct tendency for resources to follow the award of credit.
- Many of our student have an instrumental approach to course work. The award of marks or credit influences the effort they are prepared to put into an assignment.
- Where employers are participating actively in the process they express the view that students should be rewarded for achieving relevant learning outcomes.

ASSESSMENT OF WORK-BASED LEARNING

Assessment of the evidence submitted by the student is central to the award of credible academic credit.

In the learning contract model being developed in Napier University, the following principles and conditions are emerging.

Some general principles:

1 That assessment be collaborative rather than unilateral.
2 That assessment be constructive and responsive to learners' needs.
3 That the conditions necessary for good assessment must be given a priority in the allocation of time and other resources.

Some necessary conditions:

1 That there be clear learning outcomes which are agreed between learner and assessor to be relevant to the qualifications sought and valued by the learner.
2 That the credit awarded for evidence of learning should fairly reflect the quality of that learning.
3 That there be a policy regarding the nature of evidence of learning and a readiness to explore different instruments of assessment.
4 That there should be mechanisms which take account of the views of the learner and the employer in arriving at a collaborative assessment.
5 That there should be a policy for the professional development of teaching staff and of employer 'mentors', in support of the work-based learner and in the assessment of the evidence of learning which is submitted.
6 That there be a structure within an institution where the academic Board of Studies can evaluate its success in achieving its own stated aims, and adjust its practices appropriately.

The Learning Outcome

The fundamental element of the Napier model of work-based learning is the learning outcome. By encouraging the learner to reflect on learning which they already have achieved, or identify learning they will attempt to achieve, attention is paid to specifying learning which is supported by adequate evidence.

Students are encouraged to group learning outcomes they plan to achieve from placement under three headings:

Job Related Outcomes
Personal Development Outcomes
Course Related Outcomes

During the planning phase prior to going on placement, the developing list of learning outcomes is negotiated with staff in the university. The first major consideration is that the learning outcomes should be judged to be meeting the aims of the degree. The second is that the learning outcome is capable of being assessed.

Each student negotiates with a member of the university staff who will be the university assessor of the evidence which the student will offer in support of the agreed learning outcomes. The list of learning outcomes proposed by a student is used as part of the agenda during placement interviews with potential employers. Invariably, further negotiations occur which have to satisfy all three partners - the student, the company mentor and the university assessor.

Throughout the placement experience, the list of learning outcomes is regularly modified and renegotiated between all three partners to the learning contract. Before the student is due to finish the placement, they confirm with the university assessor the list of learning outcomes they wish to be assessed against.

The company mentor receives a print out of this list in the form of an assessment grid, which asks the mentor to confirm whether or not the student in each case:

a Has indeed accomplished the learning outcome.
b Has provided evidence of understanding against a scale 1-4.
c Has provided evidence of adding value.

This assessment by the mentor is invariably discussed with the student, and sent to the student's university assessor, who has his/her own assessment grid which is asking similar questions of the portfolio of evidence the student submits in support of their claimed learning outcomes, and arrives at a considered judgement as to the credit to be awarded.

By developing professional judgement through experience gained with colleague assessors and students, the question of quality and standards are continually reviewed and refined.

New Pilot Project

A spin off from this work has been a new development of the model, which is being supported through funding of another project by the Scottish Enterprise Company and Lothian and Edinburgh Enterprise Limited (LEEL). The idea is to enable the Work-Based Learning Unit to target a number of small business enterprises. The intention is to identify training needs within the small businesses, negotiate those needs into an agreed learning contract, and to use a variety of appropriate resources to meet these needs, through flexible delivery mechanisms.

One of the innovative aspects of this new pilot project, is the involvement of small businesses, in partnership with a major company, which has these smaller companies as suppliers. A major benefit to the large company is the interest they have in the continued well-being of their supplier companies, and this approach to total quality management is enhanced by the customer/supplier partnership in identifying areas for improved efficiency. It offers an opportunity for the sub-contractor to participate in an analysis of their own training needs and to improve their efficiency by developing appropriate management skills.

All of this experience leads us to see the learning contract as a powerful mechanism for holding together: what has to be learned/demonstrated, how this will be achieved, and how it can be assessed.

ACCREDITATION OF WORK-BASED LEARNING

Napier University is moving towards a credit-based system, which will incorporate work-based learning, but at present undergraduates still have to achieve a number of marks from a variety of instruments of assessment, which determines their honours degree classification.

A danger in the move toward a credit-based scheme, is that where units of credit are based on units of time, ie 1 credit = 8 hours of appropriate activity, then the discriminatory power of the model is lost. To be regained, it seems to us that we must move on from the simplistic time-based unit of credit, toward an acknowledgement of the relevant learning outcomes which can be realistically achieved and demonstrated by a learner. This would allow students to earn more or fewer credits towards their degree, by the way of work-based learning. Where courses are explicit about the learning outcomes which are at present implicit within the syllabus, the issue of credit transfer, based as it would be on credit for learning outcomes achieved, is greatly facilitated.

Moreover, the Napier experience is that this need be no more expensive than delivering university based C.A.T.S. credit - and at a stroke, takes away the widely held view that work-based learning has to be so resource intensive that it must be 'too expensive'.

By calculating the total number of units of C.A.T.S. credit available in an academic year, and dividing by the total number of available academic staff hours, we arrive at an efficiency ratio which shows that on average each available staff hour can generate 1.2 units of credit for students.

$$\frac{\text{Total F.T.E's x 120 Units of Credit}}{\text{Total number of available academic staff hours}} = \text{1.2 Units of Credit per available staff hour}$$

When we look at the units of credit available from 'sandwich' placement, and use the figures from our project to estimate staff hours necessary to support and assess this number of credits, the resulting efficiency ratio is 1.9 units of credit per staff hour.

$$\frac{\text{Units of available credit x student numbers}}{\text{Total staff hours in napier work-based learning model}} = \text{1.9 Units of Credit per available staff hour}$$

Finally, the conclusion reached by the staff at Napier University is that the award of academic credit for evidence of relevant learning is the engine which drives the process for undergraduates. For people in companies, it is the recognition that what they are learning is of benefit to them in the work that they do. The challenge confronting us is to continue to refine appropriate systems and procedures for supporting relevant learning.

Anyone interested in learning more about this approach is encouraged to contact the authors at the Work-Based Learning Unit, Napier University, 219 Colinton Road, Edinburgh EH14 1DJ, Telephone: 031 455-4390.

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25 Quality of assessment

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INTRODUCTION

Much of this volume is about the assessment of quality - this paper is about the quality of assessment. What our students really pay for (or what society pays us for) are their degrees or their diplomas or their certificates. Yet we put much more emphasis in trying to teach our students than we normally put into designing assessment - particularly the "formal assessment" that counts towards final qualifications. Assessment is where learners often get a raw deal.

The 1991 AETT Conference had the theme "Developing And Measuring Competence". As one of the editors of the proceedings of that conference (Saunders and Race 1992), I became well acquainted with the many views on competence which were aired by the various contributors. It was heartening to see that many of the approaches to the development of competence focused on defining the evidence which would be sufficient to demonstrate competence.

However, I was left with some concerns about whether competence would often end up as minimum competence rather than high competence. Figures 25.1 and 25.2 pose some questions about "shades" of competence, and about a range of descriptors which may be needed to provide more information than simply "can do".

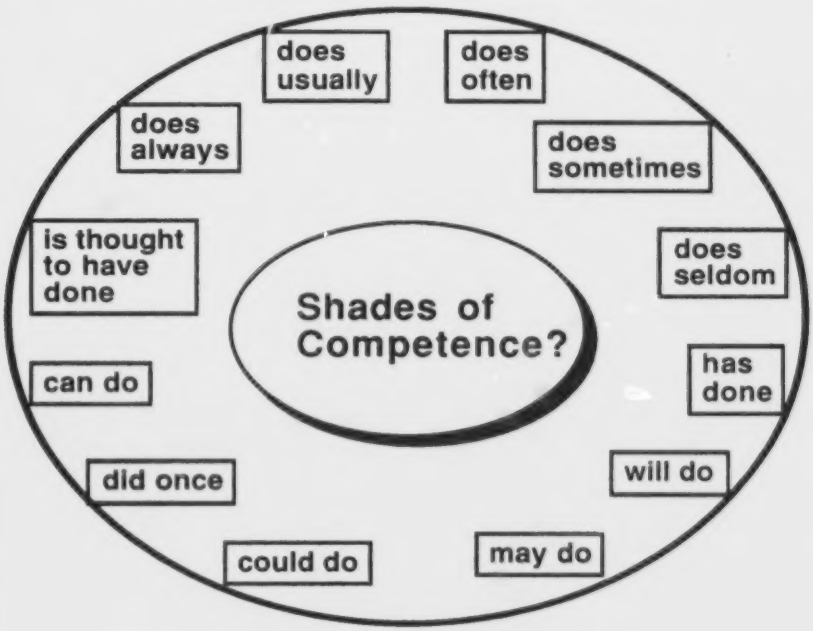

Figure 25.1 *Shades of competence*

Figure 25.2 *Some competence descriptors*

Higher education in the United Kingdom is being moved steadily towards greater participation rates. This move includes not only rapidly increasing numbers of school leavers, but also many more non-traditional entrants. Everywhere, lecturers and tutors are seeking help in handling large classes. It is clear that the workload of staff in higher education is increasing, as they become responsible for more and more learners.

In some ways, teaching can be "done to" large numbers almost as easily as to small numbers - it's almost as easy to lecture to 300 as to lecture to 100. However, teaching greater numbers may have little connection with learning by greater numbers. And when it comes to assessment, there are no short cuts. It usually takes three times the amount of time to assess 300 learners as it would to assess 100 learners. The main challenge we face as we move towards a mass higher education system, is merely maintaining the quality of assessment we presently have - not to mention improving it.

HOW MOST PEOPLE LEARN

First, consider how people learn - real people, that is, not educational psychologists or their learners! During the last couple of years, I've given thousands of people post-its, and asked them to write down the answers to the following questions on them.

1. Think of something you're good at - something you do well. Write down a few words about *how* you became good at it.

2. Think of something you *feel* good about - something that gives you a "glow". Write down a few words explaining your *evidence* for this good feeling.
3. Think of a learning experience that was not successful. Write down a few words explaining what went wrong.

The answers to "1" are almost always along the following lines:

- doing it
- practice
- trial and error
- learning from mistakes.

In other words, most people learn by doing rather than by sitting at the feet of masters or mistresses.

The answers to "2" are usually along the following lines:

- feedback from others
- other people's reactions
- because I can see the effect.

In other words, to feel good about something (including learning), people need feedback.

The answers to "3" are more complex. Sometimes they reflect things that went wrong with the "learning by doing" stage - for example lack of opportunity to practice. Sometimes they reflect things that went wrong with the feedback stage - in other words lack of the opportunity to develop good *feelings* about what had been learned. Two more problems often emerge:

- lack of motivation in the first place
- lack of opportunity to make sense of the learning experience.

LINKING TRADITIONAL ASSESSMENT TO LEARNING

So how does assessment usually relate to the four fundamental steps in the learning process? Let's take the most common form of assessment - the written examination.

- **Wanting to learn (motivation)**
  Not many people like exams! The fact that there is an exam coming along at the end of the road is not the strongest motivator for most people. The inevitability of traditional forms of assessment is a key factor in preventing many people from participating in learning.
- **Learning by doing (practice, learning from mistakes, and so on)**
  Learning by doing can indeed happen during assessments, including written exams. Mistakes are indeed made during assessment - plenty of them! But learning by doing *while being assessed* is hardly the best way of using experiential learning. Besides, it is usually presumed that the learning should have taken place *before* the assessment event.
- **Learning through feedback (to develop positive feelings about the learning)**
  All assessment results in some sort of feedback. However, it's often the absolute minimum of feedback - for example a mere score - and that's weeks or months after the event! There is little or no real feedback, and chances to learn from the feedback are minimal.

- **Digesting (taking stock, making sense of the experience, and of the feedback)** Exams are better known for producing indigestion than for allowing people the chance to consolidate their learning. As I've said, the feedback is usually very limited in scope (and often delayed in time) and is not a useful means towards "digesting". Such feedback as there is, tends to be one-way feedback. There's or no little chance to discuss the details or negotiate what best to do next.

At each step, assessment processes are at cross purposes with learning processes. Perhaps traditional forms of assessment have only one real contribution towards learning- people are frightened (shamed) into doing some learning so that they may minimise their chances of being shown to be "lacking". Much intensive learning is done just before exams - but most of it is of a superficial nature, and soon forgotten again.

TEN WORRIES - AND SOME SUGGESTIONS

I list below ten worries I have about assessment, outline my concerns, and offer some suggestions about how the problems may be minimised. Many of my suggestions point towards involving learners in their own assessment. This can be achieved by letting learners get their hands on the assessment criteria. It can be achieved even better by letting learners *apply* the assessment criteria, in self-assessment and peer-assessment. It is achieved best by helping learners to *formulate* the criteria, then apply them. An illustrated discussion of uses of self- and peer-assessment is included later in this paper.

1. Assessment is often done in a rush, to meet exam board deadlines. It's rarely done under the best of conditions!

This is because assessment tends to be done to learners - not by them. Assessment tends to be done at the end of learning something, rather than as a means to help the learning processes. In public exams, examiners often face piles of some hundreds of scripts, all of which need to be finished within only a week or two. Some suggestions for avoiding the problem are as follows:

- allow much more time for self-assessment, so that it can be done well
- allow learners to use self- and peer- assessment, so they can learn by assessing.

2. Assessment is often done by bored people, tired of reading the same answers to the same questions (and seeing the same mistakes).

Examiners get thoroughly fed-up as they wade through hundreds of scripts. They get discouraged when they see things they hoped their learners would have mastered, only to find that messages have not got across. Any tedious or repetitive task causes people to change their mood. If assessors' moods plunge, the objectivity of assessment is likely to be affected accordingly.

- decrease the emphasis on traditional written exams altogether
- allow learners to learn by reading their own mistakes, and those of their peers.

3. Assessment tends to be governed by "what is easy to assess". Therefore, traditional written exams (relatively straightforward to assess) are used. These measure learners' skills at tackling traditional written exams.

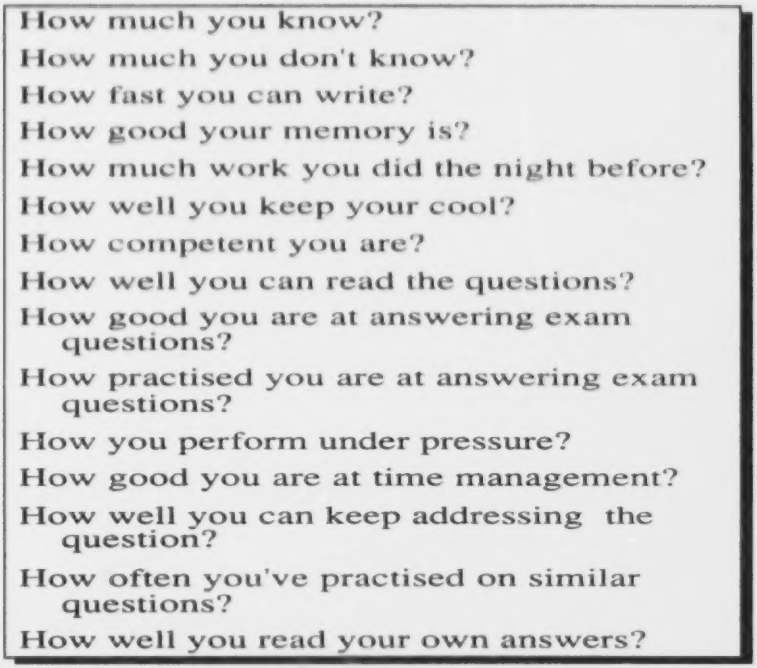
How much you know?
How much you don't know?
How fast you can write?
How good your memory is?
How much work you did the night before?
How well you keep your cool?
How competent you are?
How well you can read the questions?
How good you are at answering exam questions?
How practised you are at answering exam questions?
How you perform under pressure?
How good you are at time management?
How well you can keep addressing the question?
How often you've practised on similar questions?
How well you read your own answers?

Figure 25.3 *What exams measure?*

There is still not enough attention being paid to what should constitute the evidence upon which to base awards. Many important competences are simply not assessable by traditional methods. While it is perfectly possible to use traditional methods to measure recall of facts and information, it is not-at-all easy to use such methods to measure innovation, judgement, or personality. Figure 25.3 shows an overhead transparency that I use to alert students to the various agendas that may be served by traditional exams.

- look carefully at what is being measured by each form of assessment
- refrain from measuring the same things all the time - especially recall (people who can find and apply information are usually more valuable than people who simply happen to remember a lot of it).

4. Learners rarely know the intimate details of the assessment criteria, and how we interpret them.

There really is no excuse for this. The reason may be sinister - that those who design the assessment criteria are not sufficiently confident about them to show them to the learners! Assessors often fear that learners may demand to know "why did I get 65% for this, when my friend got 75%?" Surely, they have every right to ask this sort of question - and to learn from the feedback they should be given by way of a response to the question.

- give learners the opportunity not only to see the intimate details of assessment criteria, but also to use the criteria.

5. How should we develop learners' unassessable qualities? Should we refrain from developing them because we can't measure them?

"Don't bother to learn anything, when you can't see how they can ask you about it at the end of the day": this is a perfectly rational view taken by learners, deciding what to learn and what not to learn.

- bring the unassessable qualities firmly onto the agenda; explain to learners why they're important, and work out with learners what kinds of evidence can be linked to these qualities, and how the demonstration of that evidence can be built in to assessment procedures.

6. Almost all assessment processes in common use foster learner competition rather than collaboration. No wonder our educated people are so bad at working in teams.

Learners preparing for exams are often quite secretive about the work they do. No-one likes to be thought of as a "swot"! However, it's more sinister than this: we actually compound the competition by using norm-referenced assessment far too much. In other words, only a certain proportion of learners are allowed to receive "A" grades, or 1st-class honours degree classifications. Therefore, learners *are* in competition.

- use criterion-referenced assessment only - abolish the use of norm-referencing
- help learners to feel that they can help each other prepare to demonstrate their competence, without disadvantaging one another.

7. What competences are measured by assessment anyway? Are they "can do" competences? Or are they simply "did do, once" ghosts?

Exams tend to measure "did once" competences. At their worst, they still remember "knew once" competences rather than "did once"!

- increase the proportion of assessment schedules allocated to continuous assessment - which measures "is doing" competences rather than "did once" ones.

8. If we were to introduce "Quality in Assessment BS5750A": what should the criteria look like? What evidence of competence should *assessors* demonstrate?

At present, it is automatically assumed that anyone appointed to a post involving teaching or lecturing is blessed with all the skills needed to design assessment schemes and implement fair assessment. People are appointed to teaching (and assessing) posts not on the basis of how well they can do either task, but often on the record of their own academic performance.

- assess the assessors - have a system of "licences" to assess, and police the system thoroughly
- increase the uses of self-assessment and peer-assessment, which depend far less on subjectivity of assessors, and allow far greater amounts of feedback to contribute towards successful learning experiences.

9. "If you can't measure it, it doesn't exist. If you can measure it, it isn't *it*". What should we be trying to measure?

It has been said that one of the main faults of our education and training systems is that we tend to teach people things that are already understood, instead of equipping them to understand new things. Assessment reflects this.

- use self- and peer-assessment as an inherent part of learning processes, with the emphasis on learning rather than assessment outcomes.

10. Where stops the buck? Whose fault is it that assessment is so artificial? HoD? Employers? Assessors? Validators? The Government? Yours? Mine?

If you imply that there is something suspect about people's abilities to assess, it is badly received! Assessment is something that is usually done privately rather than publicly, and people go to great lengths to ensure that they retain privacy. Is such privacy really needed mainly because of the "put down the number you first thought of" syndrome?

LEARNING THROUGH ASSESSING

In much of my discussion so far, I've been focusing on the dangers when assessment is "done to" people, and hinting at the benefits which can result when learners themselves are allowed to be intimately involved in their own - and each other's - assessment. Self-assessment, and peer-assessment may lack some of the precision of the best of "formal" assessment - where (some) assessors have a great deal of experience, and (sometimes) assess fairly and conscientiously. However, what may be lacked in terms of precision is more than compensated for by the benefits of deeper learning, which go hand in hand with the act of learners themselves assessing.

Close Encounters with Assessment Criteria

This is the crucial difference between formal assessment, self-assessment and peer-assessment. Learners find out a lot about any subject simply by applying assessment criteria to examples of work in that subject (whether the examples are self-generated, made by other learners or issued by a teacher). Previously, assessment criteria have seemed to learners to be the property of examiners. There has been a tendency for teachers to regard assessment criteria as quite private. For many years, I marked "O"-level and "A"-level scripts for two of England's public examination boards, and the marking schemes were invariably labelled "secret". Even where model answers and marking schemes have been required to be sent to external examiners or moderators, the vital information in such schemes has seldom been shared with learners, and until recently hardly ever *applied* by learners themselves. Yet when learners get the chance to get their hands on assessment criteria, they seem to develop a thirst for the information they can derive from them - leading to much deeper learning.

Self-assessment and Peer-assessment Are Not Just Self-testing

These forms of assessment when well-developed involve two processes:

- involving learners in identifying standards or criteria to apply to their work
- allowing learners to make judgements about the extent to which they have met these standards and criteria.

Assessment Criteria: Black and White or Shades of Grey?

In subjects like maths, science and engineering, things are often either right or wrong - and it is relatively easy to devise assessment criteria for tests and exercises. However,

even in subjects such as law or social studies, there are identifiable hallmarks of a good answer or an unsatisfactory answer to a question. Such hallmarks can be turned into checklists of a flexible kind, which enable the characteristics of good and less-good answer to be compared and contrasted. Students can benefit by learning in the act of applying assessment criteria to their own work, and to each others' work.

Benefits to Learners of Close Encounters with Assessment Criteria

Learners can quickly find out about incorrect assumptions they have been making. They are able to find out the answer to the question: "What am I expected to become able to do?" There are of course many more benefits, depending on *how* we involve learners in using assessment criteria - including helping learners themselves to formulate the criteria (when this is possible or appropriate) - leading to the most obvious form of ownership of assessment.

Some Examples of Self- and Peer-assessment Mechanisms

Self assessment is not confined to the variety that is widely used in open and distance learning (though of course that is one powerful form of it). Self assessment processes can include any of the following:

- providing learners with assessment criteria and a marking scheme and allowing them to mark their own work
- as above, but then allowing learners the chance to compare their mark with that of a "professional" marker
- as above, but also giving learners feedback about the quality of their self assessment
- enabling individual learners to generate assessment criteria, and use them to assess their own work
- enabling a group of learners to generate assessment criteria, and so on
- allowing learners to use core criteria generated by a group, plus additional criteria specific to their own pieces of work, with an agreed weighting
- groups of learners can be issued with criteria to apply to each others' work
- groups of learners could produce criteria and apply them to each others' work.

There are further combinations of these. There is also the additional matter of whether the grades or scores contribute in a formal way to the performance records of learners.

Eliciting Assessment Criteria from a Group

I have found that the following approach gives useful results for groups of 10-20.

- I ask each learner to privately list (eg.) six things you would expect of a good 'x' (where 'x' could be an essay or presentation or handout and so on).
- I ask learners to go to groups of 3 or 4, and discuss criteria.
- I ask the groups to make a list of criteria, and to prioritise them.
- I flipchart the most important criteria from each group, then the next most important, etc.
- I ask the whole group whether anything important is missing from the flipchart list.
- I tidy up the flipcharted items if necessary, and number them eg. 1-8.
- I ask each learner to privately distribute (eg. 20) "marks" among the criteria.

- I write each learner's "mark" alongside each criterion on the flipchart. Then I either average them out, or allow each learner to apply his/her own weightings in the peer assessments to follow.
- Learners then go off to perform the task (individuals or groups).
- I then produce a grid with their criteria and weightings, ready for peer assessment.

An Example

I helped a group of students from a foundation course in Science, Engineering and Technology to generate and prioritise some simple criteria for a short presentation that each student was to give to the group. (The presentations were optional; the assessment for the "Learning Strategies" module of the course contained six equal elements, and students could choose which five they tried - in other words they could choose not to give the presentation if they really wished to). We agreed that anyone who had the courage to get up and start immediately deserved to "pass" - in other words they got the first 40 marks there and then. Seven criteria were then devised by the students to account for the remaining 60 marks, and the peer-assessment grids became as shown in Figure 25.4.

		A	B	C	D	E	F	G	H
Criteria	Weight								
1 confidence	5								
2 staying on topic	5								
3 well illustrated	10								
4 well researched	10								
5 handouts overheads	10								
6 dealing with questions	10								
7 timing	10								
8 **starting**	40								
Total	100								

Figure 25.4 *Peer-assessment grid for presentations*

Each student filled in a grid for each of the presentations he or she witnessed (and students additionally self-assessed their own using the same criteria). For various reasons, some students were only able to be present for half of the time involved, and one or two students participated as assessors, but did not wish to give presentations themselves. I myself worked as one of the assessors, and was relieved to find that in general, the marks I awarded each of the presentations were close to the average mark for that presentation.

Learners' Ownership of Assessment Criteria

The sort of peer-assessment described above is suitable for tasks such as presentations, where many people can assess the same piece of evidence, and where scores can then be compared and discussed by the group. For individual tasks such as essays, reports, projects, dissertations and so on, it is likely that each piece of work will reflect slightly different criteria (or even very different criteria), and then it is often best to allow for some "agreed" criteria, and some "idiosyncratic" criteria so that each learner can exercise more ownership of the assessment criteria.

The most important outcome of involving learners in the formulation of self-assessment or peer-assessment criteria, is that learners address the task with criteria in their minds, and the quality of their work seems to be much higher than it may otherwise have been.

Throw Away the Numbers or Grades?

I've often suggested to learners after a peer assessment exercise that the numbers or grades awarded (if not contributing to their overall assessment) were only a vehicle to help them do learning of a higher productivity. However, I've found they usually want to hang on to the numbers - good or bad. Perhaps this is evidence of the sort of ownership we're aiming for?

How Well Can Students Assess Themselves, and Each Other?

In general, students are quite accurate in their assessing. I have found that when students are asked to "guess" their own performance scores just after completing an exam, around 90% of students "guess" within 5% of their actual scores. It is useful to identify the 10% who had an inaccurate perception of how they had done - they usually benefit from a discussion to probe the causes. Those 10% may be over anxious, and underestimate their achievements, or over-confident and over-estimate their achievements. When discrepancies in self-assessment occur, they are usually due to one of the following causes:

- there is some tendency for learners to over-rate themselves in areas to which they are new - this tends to happen with the weaker members of the group
- there is a tendency for some learners to under-rate themselves in areas in which they are experienced - this tends to happen with the more-skilled members of the group.

Peer-assessment and self-assessment can be usefully combined. Peer-assessment can be conducted "blind" so that "arranged" scoring is avoided. If the peer-assessment mark or grade is equal to the corresponding self-assessment mark (e.g. within 5%) then the self-assessment marks go forward into the assessment system - possibly with a staff "scan" to ensure that fair play is in operation. (It is far quicker to scan a piece of work to check

whether the assessment is fair, than it is to mark the work from scratch). When self- and peer-scores differ, negotiation or staff intervention may be necessary (but this happens surprisingly rarely in practice).

SELF-ASSESSMENT, PEER-ASSESSMENT AND LEARNING

Throughout this paper, I've advocated the benefits of helping learners become intimately involved in processes of assessing, and I've pointed to the hazards of traditional assessment procedures. To conclude, lets look once again at the four main processes of learning, and see how self- and peer-assessment link to them.

- **Wanting to learn (motivation)**
  Motivation can be improved by early success. Self-assessment in particular can be used with the comfort of privacy, and learners can gain confidence by finding that they are "doing alright" long before they need to prove so publicly or formally.
- **Learning by doing (practice, learning from mistakes, and so on)**
  There's no better way to find out about one's successes and failures than by finding them out for oneself - or having a peer help one do this, rather than an "authority figure" like a tutor or examiner. The very act of assessing is intrinsically "learning by doing" - it involves the application of criteria, decision-making, judgement, and reflection.
- **Learning through feedback (to develop positive feelings about the learning)**
  The showstopper of formal assessment has to be the dreadfully limited feedback that is the norm. Peer-assessment can allow for a great deal of feedback - far more than could ever be given by a tutor or assessor. In addition, the feedback gained in peer-assessment is usually far less threatening than that from "professional" assessors. Indeed, peers will often argue and debate issues, further deepening the usefulness of the feedback exchanges they receive.
- **Digesting (taking stock, making sense of the experience, and of the feedback)**
  Both self-assessment and peer-assessment can help learners make sense of their learning experiences - and of the feedback they gain. Furthermore, the time lag between the learning and the feedback can be much less than with traditional methods of assessment. Therefore, the feedback is much more actively received and the learning thereby enhanced.

Reflecting on Assessment

It can be argued that people who need a "tester" are inadequately prepared to be sent out into the world outside. Self-assessment and peer-assessment can both be an important part of the learning process. The learning experience resulting from such forms of assessment is more important than the result of the assessment. Self-assessment or peer-assessment do not necessarily have to lead to any "formal" (recorded) assessment. The aim can be purely as a learning experience, with the "marks" simply part of the process through which that experience is facilitated.

Self-assessment and peer-assessment are skills, and become more reliable with practice. Receiving feedback on the quality of these forms of assessment is vital if learners are to derive the maximum benefit from engaging in them.

Self-assessment and peer-assessment should be introduced early - for example during the first term rather than being left until the final year. Late in a course, students may see little point in embracing new ways of learning.

"Ownership" is the most crucial aspect of successful learning, and both self-assessment and peer-assessment are closely connected to the development of ownership of learning.

Not all students warm to the "exposure" of self- or peer-assessment. They may begin their studies with expectations that they will be assessed by professionals. "What's in it for me?" they naturally may ask. They need to be convinced that self- and peer-assessment have direct benefits for themselves, and do not represent an abdication from duties on the part of tutors. Some tutors however feel it is dangerous to "lose control" of assessment. If such tutors try to employ self- or peer-assessment, but constantly safeguard their right to step in "should things go wrong", the whole concept of such forms of assessment is undermined.

So what about teaching? Admittedly, our students learn from us. But they probably learn more on their own, and they probably learn even more from each other. Much of their learning occurs in the immediate run-up to assessment of one kind or another - so the role of assessment is an important factor in the circumstances which accelerate learning. Therefore, perhaps our biggest contribution to our students' learning is directly associated with the quality of the assessment our students encounter - and has less than we'd like to think to do with our teaching activities. I believe there is a strong case for using self- and peer-assessment not primarily to assess, but as processes to enhance learning.

Finally, if and when we must resort to traditional, formal assessment, I believe that there is a great deal of room for improvement. The "ten worries" I expressed earlier may help to set an agenda for improving the quality of assessment. I end this paper with 6 recommendations.

WHAT CAN WE DO TO IMPROVE ASSESSMENT?

- Extend and develop the competence-assessment approach, where people accumulate evidence of the things they do, and when they're ready, bring the evidence forward for assessment.
- Use assessment as a learning opportunity. Give people feedback on their performance, and help to improve it. Make the primary purpose of assessment that of helping people find out how their learning is going, so that they can adjust their strategies accordingly.
- Use assessing as a learning process - help learners to self-assess their own work, and peer-assess their colleagues' work (whether or not the marks or grades are to "count"). Let learners gain familiarity with the nature of the assessment criteria which they need to live up to. Help them find out what sort of performance they need to be able to give.
- Change the culture where any professional can sit and scribble down an exam question in a few minutes, to a culture where all important exams are made up entirely of questions which have been piloted, tested, evaluated, and proved to measure desirable things.
- Develop team approaches to question setting, and marking. Introduce at the very least double-marking as a standard for exams - and when possible multiple marking.
- Pay people well for assessing, instead of just paying them for teaching. Teachers often earn "holiday money" by doing extra exam-marking. It's all the wrong way round! Assessment is so important that perhaps it should be that assessors can earn "holiday money" by doing a little teaching! Then require them to continuously demonstrate their competence at the job of assessing.

References

Saunders D and Race P (Eds) (1992) *Developing and Measuring Competence* Aspects of Educational and Training Technology XXV Kogan Page London

26 BS5750 for assessment

Workshop led by Phil Race, *University of Glamorgan, Pontypridd, CF37 1DL, UK*

INTRODUCTION

The following abstract had been published in the Conference documentation: "The workshop will be a participative event, sharing the good (and bad) experiences of participants - both of assessing - and of being assessed. The workshop will begin by extending the 'ten worries about assessment' presented in the associated paper (chapter 25 in this volume). Syndicates will examine ways and means for overcoming the problems. The primary aim of the workshop is to generate a set of 'quality' criteria which can be applied to assessment processes, practices, and instruments, to guarantee learners a fair and just assessment".

The aims and objectives of the workshop were:

- to pinpoint the weaknesses in assessment practices and devices
- to explore alternative ways of assessing
- to enhance the learning which can be derived from assessment
- to produce "quality criteria" for assessment.

PARTICIPANTS' EXPECTATIONS

Participants were given a small piece of acetate and asked to write on it their answers to the question: "what do you personally hope to gain from this workshop?". This allowed the workshop to address particular issues which participants had brought to the workshop. The acetates were displayed to the group, and clarification encouraged where needed. Their expectations were as follows:

- Where assessment fits into BS5750 (Nick Owen)
- To get an idea of how BS5750 compares with other possible models (Chahid)
- To use BS5750 creatively (Jill)
- To highlight quality criteria (Alec Bickerton)
- Relating BS5750 to assessment, specifically quality manual documentation (Michael)
- How to improve assessment - ideas, experiences of others (David)
- When and how it can go wrong (David)
- Further ammunition and ideas for reforming assessment (Bob Sawyer)
- Rationale for justifying democratic versus traditional assessment for use in the context of a traditional organisation (Jeremy Arter)
- Identifying appropriate means of assessing (non-teaching background) (Patricia)
- Criteria for designing quality assessment; ideas on using computers for continuous assessment (Chin-Poon)
- Ideas to help colleagues to more effective assessment with less quantity of work (Exam board activity can surely be just as effective with fewer numbers to crunch!) (Julie Clarke, a registrar)
- Why BS5750 is in the title but not mentioned in the abstract (Chris O'Hagan) (he found out!)
- Clear ideas about quality assessment; how to avoid unhelpful assessment of students' work (Christine)
- New insights into the use of assessment (Paul Ellis)

- Changing students' expectations to accept student-centred assessment (Larry Roberts)
- How far should courses be "assessment driven"? The relationship between assessment and outcomes. How far should the teaching and learning strategy reflect the assessment strategy? (Steve Leary)
- Ideas (Andrew)
- Ideas to use in a course I am designing where I might be able to include diagnosis as a form of student learning (Rachel)
- Some ideas on BS5750 criteria for assessment (Jill)
- Ideas, concepts to be of use with FE colleagues wrestling with problems of assessment (Jack Oakley)
- Find out a little about how FE/HE have initiated changes/improvements in assessment procedures, and how this is linked to 5750 (Peter Leckstein)

These expectations are of considerable interest in their own right. They illustrate the many different ways that people view assessment. Several expectations mentioned BS5750 in particular. The facilitator "came clean" at once on this, and indicated that the purpose of the workshop was to generate information which would lead to criteria for high quality in assessment, rather than look at how existing BS5750 documentation may lend itself to applications to assessment.

Many participants had already been present when Phil Race ran his earlier Conference session "Quality of assessment", and he issued further copies of his paper with that title. He summarised quickly how learning is dependent on the four processes of "wanting", "doing", "feedback", and "digesting" (as discussed in detail in the paper), and reminded participants that one of the intentions of the workshop was to explore how best assessment could be designed and implemented to assist these processes of learning.

FITNESS FOR PURPOSE

Participants were divided into syndicates, and briefed as follows to consider particular types of assessment, and prepare an overhead transparency addressing each of the following issues:

SYNDICATE TASK 1

Choose a type of assessment

- decide exactly what it actually assesses best
- discuss how it helps the processes of learning
- list some advantages and disadvantages of the type of assessment.

Figure 26.1 consists of transcripts of the acetates produced by the syndicates, which add up to an interesting exploration of a number of different possible processes of assessment.

INDIVIDUAL RECOLLECTIONS OF ASSESSMENT

Participants were issued with post-it slips, and asked several questions about the last assessment they themselves had experienced as learners.

Their replies are transcribed in Table 26.1. They show a fascinating range of feelings about assessment, attitudes towards the results of assessment, and views about what (if anything) was learned from the various experiences of being assessed.

1 ROLE PLAYING

What? attitudes
procedural behaviour
skills (interpersonal) (problem solving) (self awareness)
applying theory

How it helps

- confidence boosting
- practice
- experiential learning (remembered)
- time effective

Advantages

- build a profile
- guide to competence
- peer learning
- effective learning
- instant feedback

Problems

- student reluctance
- 'ego trip' for some
- not taken seriously
- unreal
- traumatic, subjective

2 ORAL PRESENTATION

- on behalf of a group

What it assesses

Group Work

- content against objectives
- design and organisation
- time management
- visual aids
- use of sources
- ability to answer questions

Individual

- presentation style
- voice
- use of audio-visual aids

How it helps learning

- immediate feedback
- group learning
- peer tutoring
- peer assessment

Advantages

- validity
- good learning environment

Problems

- time consuming
- free riders
- design consistency

3 SELF-ASSESSMENT

What it assesses

An example: bricklayers and total quality management programme

How it helps learning

- ownership
- involvement

Advantages

- involvement leads to motivation
- realisation of responsibility
- focuses responsibility
- another ethic throughout the organisation

Disadvantages

- how will they judge for themselves their ability to implement their learning?
- cost of establishing competence criteria
- being adhered to?
- policing outcomes
- abdication of responsibility?
- honesty? cover up mistakes?

4 STUDENT SELF-ASSESSMENT

Examples: portfolio of work, exhibitions, microteaching, teaching a lesson

What it assesses

- students' perceptions of their own learning
- all areas (Bloom)

How it helps learning

- leads to learner autonomy

Advantages

- reflective
- diagnostic
- developmental
- load taken from tutor

Disadvantages

- abuse?
- subjectivity
- false humility
- subversive

5 PERFORMANCE ASSESSMENT

What is assessed?

conformity to norms: job-related criteria

How it helps learning

it can help learning, but it aims:

- to qualify,
- to certify competence,
- to verify.

Advantages

- clarity
- a working tool

Disadvantages

- time to establish

6 SKILLS ASSESSMENT

- skills being assessed
- conditions specified
- standards of achievement identified

What is assessed - ability to carry out a task or perform a skill

How it helps learning

- sequences / prioritises the learning process
- identifies difficulties

Advantages

- Indicates skills
- "I can do" / "feel good" factor

Disadvantages

- resource demands heavy
- resource driven

Figure 26.1 *Fitness for purpose of different types of assessment*

It should be remembered, however, that the participants themselves represented learners who had succeeded. Their views would therefore be expected to be considerably more positive than an average group of learners, whose future careers may still depend upon what happens next time they are assessed.

Individual Task Briefing

Think back to the last time you were assessed.
On a post-it, write notes under the following headings:

A	*What form did the assessment take?*
B	*How did you feel just before the assessment*
C	*How do you now feel about that assessment?*
D	*What was assessed? Was it process, product or something else?*
E	*What did you learn from that assessment?*

A ***Form of Assessment***	***B*** ***Feelings just before***	***C*** ***Feelings now***	***D*** ***What was assessed***	***E*** ***What was learned***
1 day at assessment centre psychometric test, formal presentation, groupwork interviews	v. nervous anxious to perform well	It was efficient it aimed to be objective I feel good about it	Management style, flexibility, depth/range of learning experience	very little other than about an assessment process
Written essays	very tense	calmer now	process, product + something else	knowledgeable about the subject tested yet gaps in my knowledge
Demonstrating comm. skills	Nervous but confident	satisfied	process and product	lots - like trusting my
Interview	Nervous but also glad to have the opportunity to try to sell myself	Very pleased because the process gave me the chance to sell myself	Analytical abilities personal qualities	I confirmed that interviews are a process I quite enjoy.
End of year exam	Slightly tense but fairly confident; relieved	One should not be judged on the basis of one day's result	process and product (psychology course)	How to determine fair criteria for assessment

A Form of Assessment	B Feelings just before	C Feelings now	D What was assessed	E What was learned
Reading, writing, interview using English and French	Surprised	Reassured by useful nature of assessment	Process: reading French listening to French, summarising, thru product writing in English	The need to improve my listening skills, mostly.
PhD Oral examination	v. apprehensive about the nature of the dialogue with the examiner (i.e. aggressive)	Good test that I had done the work and understood it and the background.	That the work was my own. Intellectual skills. Ability to summarise. Logical thought.	Nothing much but that wasn't the point (or was it?)
Written/oral	No special feeling	No special feeling except my work is appreciated.	Skills of cooperation	One's energies were readily appreciated and accepted by one's boss.
Verbal grilling	Uneasy (no forewarning)	Good	Product and process - ability to rapidly assimilate data/info - formulate coherent answers - communicate answers	Beware! Better knowledge of how to handle this individual.
Open book exam (written)	Confident	Fine - I passed!	Process	That I have a good memory.
Written exam	Tensed	Too much to study and memorise	Product	Can't remember!

A Form of Assessment	B Feelings just before	C Feelings now	D What was assessed	E What was learned
Assignment	Unsure as to the standard required.	It gave me a degree of autonomy in the learning process.	process/product	The standard of learning required.
Submitted papers	Inadequate - that I might not have sufficiently coherent story	Choice of examiner might have been critical.	product	Nothing
Questionnaire to students about quality of a 10-week course.	Always vaguely anxious	Quite happy	Teaching performance Relevance and interest to students of material.	Course is basically OK so is my teaching (probably better than the material)
Oral questioning 'viva voce'	Terrified	Relieved, then depressed then elated	process, product: results and conclusions	How to do it better. checking out carefully.
Score, with written feedback making comments.	Apprehensive, excited. Hoping for good grade.	Good, as I obtained a high grade.	Content being process and product	I know more than I thought. Recognition of hard work.
Practical exam	Very anxious	angry	Conformity and sang froid	Not to bother taking it again. Incompetence of the examiner, both technically and as a person.
2-hour test	distraught	empty	my ability to write at speed.	That it did not test my understanding of the process.

A *Form of Assessment*	B *Feelings just before*	C *Feelings now*	D *What was assessed*	E *What was learned*
Unseen written test on profit/loss accounts.	Nervous, unhappy	Glad I was brave enough to abandon the course at that point.	Product. Stored knowledge regurgitated.	That I have no aptitude for financial management.
Written test	Tense	Nothing, long ago	Product	Nothing of importance.
Presenting audit findings in front of video (leading a panel)	Sick	Happy because it went well - passed.	Content of audit. Method of telling them.	Must be well prepared. Stick to facts, not opinions.

Notes

- The different types of assessment listed above show that in the 'real world' traditional forms of assessment (such as written exams) play a much smaller role than is often imagined.
- Most of the feelings just before the assessment (of whatever kind) are 'negative', and therefore are probably undermining the quality of the learning experience at that stage.
- The feelings 'after the event' tend to be mostly positive in the cases listed above. This is largely because the various assessments tended to be successful. With a 'normal' cross-section of people (i.e. *not* delegates at an International Conference), there tends to be considerably more 'anger' and 'frustration' when people reflect on the lack of appropriateness of various kinds of assessment that have been applied to them.
- 'What was assessed': the entries under this heading span a very wide range of skills and attributes. Only some of these can be attempted to be measured using conventional traditional assessment measures.
- 'What was learned' entries are very revealing. Often, the learning outcomes have little to do with the skills or knowledge being assessed. This demonstrates that the lack of detailed feedback in many assessment procedures is responsible for 'missed learning opportunities'.

Table 26.1 *Participants' experiences of being assessed*

LAYING DOWN THE LAW

Participants were again divided into syndicates, and asked to produce and overhead transparency giving their recommendations for "criteria for quality in assessment". Each syndicate presented its acetate briefly to the whole group. The following are transcripts of the acetates produced.

1 Recommendations for Assessment

1 Of both process and product
2 Emphasis on verification/certification of product

It must:
- be standardised - as a process
- give practical feedback
- be standardised against established criteria/objectives
- be valid/content/predictive
- be reliable
- be appropriate to the task
- be easy and practical to use

2 Laying Down the Laws

a) Never use just one method to assess anything - use as many as possible.
b) Avoid numbers (or letters) as "marks" where possible. Use words.
c) Be diagnostic where possible, not normative. (Act on the diagnosis).
d) Be student-centred where possible (Profiles, not single shots).
e) Explain all criteria used beforehand to the students. If possible, negotiate them with the students.
f) Spread the lead on both students and staff.
g) If judgemental, be gentle.
h) Failure → diagnosis → counselling → opportunity → success.

3 Criteria for High Quality Assessment

- Exams scrapped!
- Honest
- Fast feedback
- Concise, no jargon
- Fair
- Encouraging, confidence-building
- Achievable
- Continuous
- Not threatening
- Learning experience
- Flexible

4 Criteria for Quality Assessment

1 Link assessment to outcomes of teaching - ie. what did you plan for students to

know, understand and become able to do?

2 Use assessment to:
- identify what students may need to learn
- celebrate what students have achieved
- diagnose students' problems
- suggest how students can improve (formative)
- summarise what students know at the end of a course
- give information to future employers.

3 Use different assessment techniques to match different course approaches. Don't rely on one method of assessment.

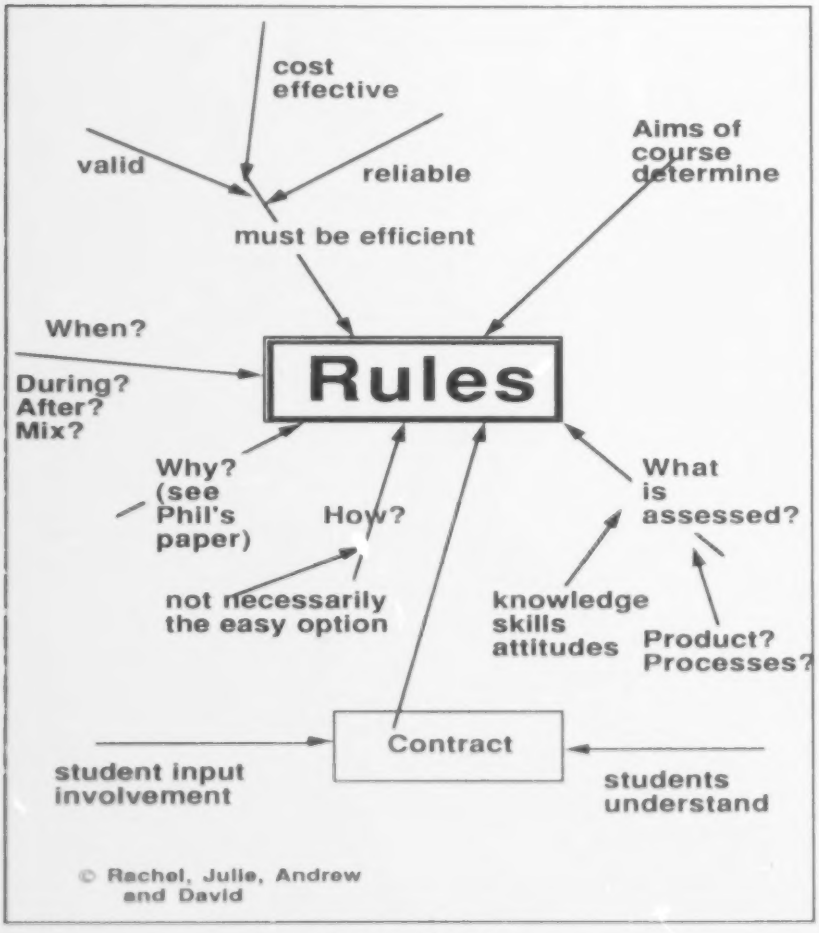

Figure 26.2 *Rules for assessment*

5 Laying Down the Law: Asking the Right Questions about Assessment?

- Is it necessary?
- Is it relevant to the course objectives?
- Is it valid?
- Is it accurate and reliable?
- How does it build confidence?
- How does it lead to learning?
- How does it reinforce learning?
- Does the assessment drive the curriculum, or the curriculum drive the assessment?
- Is it fair to different students?
- Can the students practice?
- Can students know the criteria?
- Can students influence the criteria?
- Can quality feedback be given to students?
- Can the results of the assessment be used to redesign the assessment strategy and the teaching/learning strategy?

6 A Visual Approach

Figure 26.2 shows one syndicate's visual approach to "laying down the laws".

CONCLUSIONS

I had fun running this workshop, and I think participants rather enjoyed it as well! It was a "busy" workshop; participants produced a great deal of material in the 90 minutes involved. Although delegates to an international conference on education and training are somewhat self-selecting in that they are people whose education and training experiences tend to have been highly successful, I hope that this collection of their wisdom and experience may be useful in helping to make assessment processes in general better-suited to their purposes. I hope that in particular, we may move further towards using assessment as a valuable part of the learning process, rather than a way of measuring how far the horse may have bolted after leaving the stable door unlocked!

Acknowledgements

I am grateful to all the participants who took part in this workshop:

J Arter, A F Bickerton, Brian Canniford, Chu-Poon Yap Ching, Julie Clerk, Paul Ellis, Chahid Fourali, J Greenacre, Rachel Hudson, Steve Leary, Peter Leckstein, Jill Lloyd, Patricia McCarron, Chris O'Hagan, Jack Oakley, Michael Owen, Larry Roberts, Bob Sayer, Michael Shoolbred, Prof A R Sykes, Christine Tan.

Section 5: Quality in Teaching and Training

The papers in this section fall into two groups: three address the quality of teaching in higher education, and two of these consider the role of teacher appraisal in the process of developing quality. The clear message conveyed is that quality will be enhanced only if those seeking to bring about change understand and acknowledge the meanings teachers give to their professional activities and experiences. The remaining three papers describe applications of technology to training and total quality approaches to managing the design and development of CBT.

In "Eating frogs and bridging gaps - post-Warnock conditions for teaching quality", **Clive Colling** explores the implications of the five conditions for teaching quality in higher education identified in the report of the Committee of Inquiry set up by the Polytechnics and Colleges Funding Council. His observations are important and timely, given the context of recent increases in participation rates in this sector.

David Jones and Janet Hanson take up the challenge of the Warnock Report and demonstrate in their paper, "Teaching quality - 'I know it when I see it!'", how one higher education institution has set about identifying, supporting and developing good teaching practice. They outline a scheme for the appraisal of teaching practice, report the opinions of participants, identify proposed changes to the scheme in the light of the pilot and address wider concerns expressed about teaching appraisal in the education literature. In "Upward appraisal and its implications for higher education", **Gerard McElwee** and colleagues report the use of a questionnaire based on a ten-dimensional model of quality, developed for the service sector, in appraising lecturer performance. Although they focus mainly on the reactions of a sample of lecturers in a UK Business School to the use of students as appraisers, they also address the consequences of upward appraisal from the student point of view and indicate how upward appraisal data can be used to enhance the quality of teaching and learning.

In "A total quality approach to managing CBT development", **Steven Shaw and David Shaw** describe techniques and approaches for reducing cost, improving quality and assessing quality in CBT. They provide a useful and detailed guide to quality management methodology that could be implemented at the level of a training division or department, even if a commitment to TQM has not been embraced at a higher, strategic level by the organisation as a whole. **Meurig Williams and Graham Carr** show in their paper, "Towards quality management in training design", how an integrated quality management policy is applied throughout the training development cycle, and across all training media, by the Training Development Group at Lloyds Bank. They also present a case study which shows how quality management tools are used in CBT courseware production.

Peter Willis and John Eary, in "Achieving quality in networked interactive video", describe an award-winning multimedia system for training police supervisory officers in crowd control procedures at major spectator events such as football matches. They outline the quality approach in the design of the system, describe the equipment, functional specifications and the system-in-use, and identify its potential for management training.

27 Eating frogs and bridging gaps - post-Warnock conditions for teaching quality

Clive Colling, *University of Northumbria, Newcastle-upon-Tyne, NE1 8ST, UK*

THE QUALITY DEBATE

People have very different views about what constitutes "quality" in higher education. Some believe the provision of material resources/equipment, buildings, etc to be a major criterion; others highlight the qualifications of staff and the examination results of students. Evidence of innovation, staff development, employer liaison and the pastoral care of students are also considered to be important indicators of quality.

But at the point of delivery of any higher education system must be high quality curriculum content, effective and meaningful assessment procedures, and high quality teaching. Good teaching promotes good student learning, and exceptionally good teaching encourages students to be independent learners who know how to apply their knowledge and skills in practice, and consequently how to learn for themselves. Promoting learning by enabling students to "learn how to learn" will be the major criterion for successful professional teaching activity in higher education in the 90's. But achieving efficiency of teaching with effectiveness - for example, coping with high numbers of students for less time in restricted space - will be a major dilemma. Rarely has a decade started with so many challenging prospects for managers and teachers in higher education in the UK.

Eighty-seven thousand more students, 41,560 of them full-time, are projected over the next three years: a remarkable scenario, exceeding even the Government's expectations on greater access. Annual rates of growth of up to 33% are predicted by 24 former Polytechnic and Colleges Funding Council sector institutions, including five former polytechnics. Against this backdrop, doing nothing about teaching quality is not an option. There is an imperative for higher education institutions to accommodate students with a wider range of academic and practical experience than before, many of whom will not have the traditional qualifications for entry. Not only will entry requirements and procedures have to change, but teaching methods and design of courses will have to meet the needs of the new types of student. The Government believes that increased participation in higher education need not be at the expense of academic excellence; but it will be for the HEI's themselves to find ways of meeting the difficult challenge of maintaining (and enhancing?) quality standards in the 1990s.

Universities and Colleges therefore face a fundamental change, in the next decade, if the Government's aim of increasing access to higher education is to be achieved. All institutions need as a matter of urgency to find ways by which they can ensure that an influx of more students will not adversely affect the quality of the education that is offered. "Teaching quality" thus takes on a new significance.

FOCUS ON TEACHING

In 1988, the then Secretary of State, in a letter to the Chairman of PCFC, confirmed the Government's concern that teaching quality should be taken into consideration by the Council. He wrote "I look to the Council to develop further indicators of both the quality and quantity of institutions' teaching and should be grateful if it would ... consider how

these might be used as an input to its funding policies and decisions". While research has for generations been evaluated in higher education funding decisions, and its quality and efficiency both subject to review, teaching had not been subject to this kind of scrutiny. Now it was quite clear that the quality of teaching was to be one of the criteria employed in the allocation of funds.

The Committee of Enquiry into Teaching Quality, chaired by Baroness Warnock, was set up by the Polytechnic and Colleges' Funding Council in January 1989. The terms of reference were:

a) to identify characteristics of effective and efficient teaching;
b) to identify which of these characteristics can be developed as indicators of teaching quality;
c) to suggest the means by which institutions could demonstrate the effectiveness and efficiency of their teaching and the promotion of students' learning;
d) to advise on possible strategies for the Council which would serve to raise the quality of teaching. These might include procedures for monitoring and evaluating outcomes, and funding mechanisms (PCFC 1990).

The Warnock Committee met in April 1989, and held nine further meetings. In May 1989, 84 PCFC institutions were invited to respond to three questions:

a) how does your institution identify efficient and effective teaching?
b) what is your institution doing to preserve high quality work once it has been identified?
c) what is it doing to improve quality in those areas which have not been so identified?

Responses were received from 57 institutions. The Committee analysed the responses, and followed them up with a programme of visits, covering modular course arrangements, mature students, the teaching of engineering and modern languages, Enterprise Initiative developments, initial teacher training and the teaching of humanities. Institutions visited included a specialist arts institution, an institution that works with more than one validating body, and several which had educational methods or development units.

A review of relevant teaching and learning literature was commissioned. A series of consultations and discussions took place with representatives from industry, commerce and the professional bodies. The key points in the Committee's report (PCFC 1990) are:

a) that teaching must be interpreted broadly, as the initiation and management of student learning by a teacher; that it must be responsive to student needs; and that the conditions necessary for good teaching must be a priority at every level of the institution;
b) teaching must be judged "good" by whether it contributes to the purposes of higher education - the life-chances of the students; excellence in teaching could be traced to the ethos of the whole institution;
c) five necessary but inter-related conditions must be fulfilled before teaching can be judged good:
   - clarity of aims and objectives related specifically to teaching, and confidence that they are worthwhile and appropriate to students' needs;
   - a policy regarding curriculum organisation and delivery, including a readiness to consider different methods of promoting learning;
   - a policy for professional development of teaching staff, including appointment,

induction, appraisal and development;
- means by which the views of students and employers can be used in judgement of the curriculum, its delivery and outcomes;
- an identifiable framework within which an institution can evaluate its own success in meeting its objectives and adjust its practice accordingly.

RHETORIC INTO REALITY

John F Kennedy said, "Change is a way of life. Those who look to the past or present will miss the future". Translating the recommendations of the Warnock Committee into practical action in classrooms, labs and studios across the former PCFC higher education sector will require change. Change is constant in many enterprises but, as somebody once said, in education, interpreting change is rather like trying to grasp fog. A head teacher friend once likened managing educational change to trying to build a ship - at sea, from the keel up!

It is important that any change to professional teaching practices in higher education is seen to be constructive and positive; supporting and encouraging existing good teaching practice, rather than trying to revolutionise processes that have been going on for a long time. Certainly, some old assumptions may need to be tossed out - does one hour's lecturing automatically produce one hour's learning? - but there should be no pig-headed insistence on change for "flavour of the month" purposes. A lot of excellent educational practice exists across student learning outcomes. It is a matter of:

- examining and knowing what we actually do, as teachers and managers of learning resources;
- learning from the past - both the good and the bad;
- working together to promote growth (do we really collaborate effectively, as professionals?);
- knowing and using our limited resources effectively;
- assessing our own performance;
- using the corporate aim to put students first, and keep our thinking focused on the institutions' performance.

A first scan of Warnock's five conditions may produce the response "We've been doing this for years!" from some teaching colleagues. But "doing this" sometimes equates to symbolic action, undertaken and written about in order to satisfy a plethora of committees. Literally interpreting the tasks encompassed in the five conditions requires a professional engagement with difficult tasks, and the raising of hard questions. A brief "Cooks Tour" may illustrate my point.

CONDITION 1

Teaching aims and objectives should be clear, worthwhile and appropriate to students' needs.

What do "clear", "worthwhile" and "appropriate to students' needs" mean for individual teachers, their courses, their students and their particular employers? One key recognisable characteristic of quality must be relevance. A key quality process must be to do with listening. Listening is strategic! The student perception is a reality. We need deliberate self-critical analysis of teaching practices and procedures in order to continually

seek to improve what we provide for students. Does our teaching promote learning as part of a high quality student experience? Do we listen to what students say? Do we hear what they say, when they say it? Do we do anything as a result? There will need to be a partnership in deciding what is "clear", "worthwhile" and "appropriate".

CONDITION 2

Curriculum policy should encourage new methods of promoting learning.

There are extraordinarily innovative educational practices going on across the former PCFC sector. The problem in the present competitive climate is finding ways for professional teachers to share good practical ideas. The point is, many institutions are hotbeds of experimental activity in teaching and learning, and the Warnock recommendations are quite clearly supporting and encouraging constructive change and investigative educational development. To stand any chance of claiming extra cash for teaching quality, institutions will need to be able to demonstrate that the education they offer will enhance students' understanding and imagination, and "excite their intellectual curiosity and expand their knowledge and skills". Simply floating the usual papers at review and validation time won't be enough. It's not just a matter of what course teams feel, think and know about the curriculum, it's what they do. Are they promoting active learning? Live projects? Independent, autonomous learning? Peer assessment? Collaborative group work? etc, etc.

CONDITION 3

Professional development policy should include appointment, induction, appraisal and development.

For many of us, this is the really good stuff. The Warnock Report recommends that induction courses for teaching staff should be compulsory for all teachers in their first year and that induction should continue beyond an initial course. Teaching methods, strategies and tactics should be all built in here. The Report is giving a hefty shove to the whole idea that teaching should be way up on institutional agendas. It is saying that there should be visible reward systems for good teaching and that senior management should support strategies aimed at raising the general level of teaching. The message is that full-time and part-time teaching staff should have access to support for their own professional development. And we are not talking about some weekly "Mary Poppins good time hour" here, but properly structured, organised, funded and delivered staff development programmes. (For the checklist of important criteria, for interpreting condition 3, take a look at page 49 of the Warnock Report.)

CONDITION 4

Students and employers should contribute to the judgement of curriculum design, delivery and outcomes.

Many courses in many institutions have for years actively involved students and potential employers in educational development decision-making. Perhaps others have simply talked or written about involving them. The message from Warnock is quite clear: institutions should commit resources to actively seeking the views of employers,

professional bodies, staff and students about the needs, requirements "and imperatives" for each group. (Again a checklist of possible criteria can be found on page 50 of the Report.)

No one would claim that there is a "handy dandy" quick-fit way of involving students and employers in judgements about curricula, delivery and outcomes. We really do need innovations and intelligent thinking in this area. It just isn't feasible to produce thousands of feedback questionnaires for example, which nobody ever analyses or interprets, and which have no status beyond being "draft" excluders in small overcrowded staff rooms. The views of students and employers need to be used to "actively improve" the planning and delivery of academic programmes.

CONDITION 5

Institutions should evaluate their attainment of their objectives, and adjust their practice accordingly.

Throughout the years of CNAA rule, courses, departments and institutions have stated objectives. The "objectives" business has become a fine art. Those colleagues who can string the right fine words together for course documents are in much demand at review and validation times. "Look at this Linda! 'Collaborative, activity-based, student-centred, formative assessment procedures will underpin course principles for high quality pedagogic action'. It's a wrap, they've got the lot there!"

But promoting and supporting institutional self-evaluation is about making objectives operational, and negotiating what they mean in action. What are the unintended outcomes of stated objectives? How should they be reviewed and redefined? What are the key criteria and indicators of true progress and improvement? What sort of evaluation evidence will serve as a basis for claims of "outstanding" quality in the next funding round?

HEIs have fulfilled their obligations for stringent quality assurance to the Council for National Academic Awards for years. Peer validation review procedures have done an excellent job in sustaining and monitoring quality for students across the former PCFC sector. Warnock's fifth condition is, however, seeking to build on existing review practice, by recommending to the Funding Council that it looks for specific evidence of commitment to teaching quality enhancement not just at course and departmental level, and not just on paper, but throughout the management and practice of the institution. This is a harder edged perspective, and is underpinned by the principle stated in the Report that the conditions necessary for good teaching must be given priority at every level of the institution.

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28 Teaching quality - "I know it when I see it!"

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INTRODUCTION

In October 1990 the Warnock Report on teaching quality threw down the gauntlet, sheathed in a velvet glove, challenging higher education institutions to demonstrate how they could identify, support and develop good teaching practice. This contribution demonstrates how one institution, Bournemouth Polytechnic (now Bournemouth University), took up this challenge. An Appraisal of Teaching Practice scheme was developed and piloted in two departments in Autumn 1991.

The scheme devised is both developmental and evaluative. It aims both to enhance teaching quality by identifying good practice and facilitating the development of appropriate staff development, and to allow the institution's Academic Board to obtain an aggregate view of the teaching quality of each department. It involves the judgement of a peer and the individual lecturer's head of department. Both observe two teaching sessions and give verbal and written feedback to the lecturer concerned.

This case study provides an insight into the main issues involved in the observation of classroom practice in a higher education environment and discusses the practicalities surrounding its implementation.

DESIGN OF THE PILOT

At the start of the pilot we suggested three aims for the exercise:

- all parties to emerge from the process with their dignity and integrity intact;
- that the experience should lead to a continuing improvement in teaching;
- that we should be in a better position to advise on the design and implementation of a future system which would achieve the first two aims.

The overall response emerging from the review of the pilot suggested that we were not far away from achieving the first two goals and we also think that we have found ways to improve on the initial appraisal of teaching quality pilot.

The pilot involved staff from the departments of Business Information Systems and Product Design and Manufacture and took place over a period of three weeks between 7 and 25 October 1991. Involvement was voluntary and 27 out of 29 staff from the two departments took part as appraisees.

The appraisers comprised the five heads/associate heads of the two departments (A/HODs) and 13 experienced members of the Course Evaluation Group (CEG). This group acts as a peer review body for course approval and monitoring and was therefore the natural place to look for peer appraisers of teaching quality. Indeed, members are frequently appointed to this group on the basis of recognition of their teaching expertise. The head of department also seemed a natural choice for appraiser. As the lecturer's line manager, he has responsibility for assisting the individual to make use of staff development opportunities.

Two observation sessions per member of staff were planned, both to be observed by the appraisee's A/HOD and a member of the CEG. One session was selected by the

appraisee and the other by the A/HOD. We decided that, if possible, each appraisee should have the same CEG appraiser observe both sessions.

Following early discussion with the departments involved, we varied the pilot to include a group who would be appraised for one of the sessions by a subject specialist instead of the A/HOD This group was selected on a random basis and those selected were asked to nominate a subject specialist appraiser. Four of these appraisers were eventually nominated. In total, 54 sessions were arranged and the responses from the evaluation questionnaire covered 35 sessions.

The observation criteria agreed by Academic Board were:

1 Organisational and structure of session
2 Clarity of presentation and use of resources
3 Presentational style and classroom management
4 Monitoring of effectiveness
5 Whether the aims of the session have been met

Three staff development workshops were held for the appraisees and two for the appraisers. These were designed and managed by the authors.

APPRAISAL PROCESS AND DOCUMENTATION

The appraisal of teaching process involved four key stages for each session appraised:

1 Briefing meeting
2 Observed session
3 Verbal feedback
4 Written feedback

1 The briefing meeting between appraisers and appraisee which took place before the observed session was regarded as an integral part of the appraisal process. The appraisee was able to set the scene in terms of such matters as the stage of development of the course, the objectives of the session, and the student group. The appraisee was also able to suggest particular features which he/she would like the appraisers to focus on during the observation. Guidelines on observing teaching behaviour and on giving and receiving feedback were provided to all taking part.
2 The observations then took place and the appraisers' comments were recorded on the observation record designed for the pilot.
3 Verbal feedback and discussion of the session with the appraisee took place as soon after the observation as possible.
4 The written feedback record provided the formal record of the process of observation and feedback and included suggestions for future action. It was designed to be completed jointly by the appraisers and sometime after the verbal feedback sessions. A copy of the record was then sent to the appraisee who signed it and if appropriate added further comments before sending it to their head of department.

REVIEW OF THE PILOT

At the end of the three weeks of observation activity a review of the exercise was carried out. The review was based on a questionnaire circulated to all participants who provided

individual and anonymous comment on a range of matters. When the results of the questionnaires had been collated, meetings were held with groups of appraisers and appraisees to check the findings.

The questionnaire asked for specific information about the details of how many sessions were observed, the type of sessions and how long the process took. It also sought the opinions of appraisers and appraisees on several aspects of the process, including their experience of observing and being observed, the adequacy of the preparation for the appraisal scheme and any suggestions for changes.

The response rate was high. 21 replies were received from 27 appraisees (78%) and 18 replies were received from 18 appraisers (100%).

Comments About the Briefing and Feedback Sessions

We had stressed that these were an integral part of the appraisal process so we wanted to find out how well they had been carried out and to what extent the appraisee had been encouraged to take the initiative in asking the appraisers to focus on specific features of the session. In the event, the problems of matching the timetable of the appraisees and the appraisers meant that only 20% (4) of the appraisees had the opportunity of holding a briefing session prior to both observations though 70% (14) had one briefing session. 66% of the appraisees felt they had been given an opportunity to ask the appraiser to focus on a specific feature of the teaching session.

Comments About the Immediacy of Feedback and Follow-up Action

The literature on feedback underlines the value of a quick response and over 95% of those appraisees who responded said they received verbal feedback quickly after each session. The written feedback was not so immediate and frequently not provided.

Giving Feedback

Most appraisers appear to have followed the guidelines on giving feedback in that 75% (15) of the appraisees who were observed reported that they had an opportunity to put their own views first; 80% (16) said they were given an opportunity to seek clarification and all those observed felt that their views were valued.

Comments on the Observation Criteria

The observation criteria were found to be helpful by 68% of [13/19] appraisees and 71% [12/17] appraisers in preparing for the session.

Comments on the Validity and Utility of the Appraisers' Observations and Feedback

During the preparation sessions some concerns were expressed about the relative value of specialist as opposed to non-specialist feedback. Indeed the pilot design was varied to allow a small group of observations to be undertaken by subject specialists nominated by the appraisee.

The results of the questionnaire showed little variation between the rating of the Course Evaluation Group members, the HOD/AHOD and the subject specialists. This perception is confirmed by the appraisers, in 66% (12/18) of the cases appraisers reported that their comments always matched those of the second appraiser.

Comments on the Overall Quality of the Appraisers

Despite the overall endorsement of the validity and the utility of the appraisers' observations, some concern was expressed by the appraisees about the quality of the appraisers. The concern centred on the need for objectivity. Many other characteristics and qualities emerged in response to the question which was asked of appraisees and appraisers: "What are the qualities of a good appraiser of teaching practice?"

There was encouragingly a good deal of overlap between the set of responses.

Sample of appraisees' comments: "Willingness to discuss with humility not desire to impose own style preferences" and "Someone who doesn't try to impose own teaching methods on a colleague".

Sample of appraisers' comments: "Promote sessions as exchange of methods" and "To give constructive feedback".

Comments on the Preparation Sessions

The questionnaire data indicated that the training was successful in explaining the concept of teaching appraisal; 65% (13/20) of appraisees and 83% (15/18) appraisers agreed this to be the case.

Personal Concerns

The pilot scheme inevitably aroused much uncertainty among lecturers, so both sets of respondents were asked to say what concerned them most about the process and also to identify the principal benefits to counteract the feelings of uncertainty.

Some clustering of views emerged from the individual comment of the appraisees (21 respondents). These covered concerns about the increased administrative load connected with the scheme; the quality of the appraisers; the need for staff development support to underpin the development of teaching competence; the representativeness of the sample of observations; and the use to be made of the information collected about an individual's performance.

Overall the comments of the appraisers (18 respondents) did not group as well as those of the appraisees, but concern was also expressed about the eventual use of the information and the additional administrative load. We return to these concerns when we consider the modifications we propose to make to the pilot scheme.

It was clear that both appraisees and appraisers placed a high value on the outcomes of the appraisal process and saw its contribution in terms of improving practice, personal benefits and reflection. In answer to the question: "What do you think might be the benefit for your personally of the appraisal of teaching practice?" Appraisees' replies included: "Thinking and talking about my teaching with colleagues" and "Nothing but improvement in my teaching skills".

It was also clear from individual comments that appraisers felt that the process was valuable in terms of their own learning: "Exchange of ideas and different perspectives" and "I learn for my own teaching".

PROPOSED CHANGES TO THE APPRAISAL OF TEACHING PRACTICE SCHEME

As a result of the pilot experience and the feedback provided by the review, we decided to make several changes to the appraisal process and the documentation should we run it again.

In view of the relative agreement of views between the CEG appraisers and the A/HOD's we decided that we could relax the requirement for both sessions to be observed by the A/HOD. A/HOD will only observe one session.

We also felt that our choice of the CEG members as peer appraisers was justified since there was little difference in the validity and usefulness of their observations compared with those of the subject specialist observers.

We felt that the observation criteria had not been sufficiently detailed to provide specific enough feedback to the appraisees or to be very helpful to the appraisers when planning the observation. A tool which some had found very useful was the list of "effective teacher behaviours" developed at Newcastle Polytechnic (Colling 1990). We felt it would be useful to extend the use of this tool but we did not wish it to be regarded as a detailed checklist. We decided to remove our existing criteria and invite appraisees and appraisers to negotiate criteria for each session. We suggest that the list of effective teaching behaviours can be used as a way of identifying specific teacher activity to be observed, which may differ in each session and that the list of effective teacher behaviours provides a common vocabulary during the verbal feedback session.

We also felt that the list as published covers teaching behaviour which can be observed mainly at lectures and seminars but over a period of time we expect to build up a bank of additional activities and effective behaviours which apply to the teaching specific to this university.

Very few appraisees received any written feedback and we realised that our method was not designed to encourage this, so in future we will advise appraisers to give verbal and written feedback during the feedback session. We have revised the written feedback form to encourage appraisees to use it first to reflect on their performance, and their comments are then followed by appraisers' comments. This means that only one piece of paper is in existence and it remains with the appraisee to pass it on to their HOD. The appraisers will also be urged to leave their observations records with the appraisee. We feel that these procedures should help to give the feeling to the appraisees that they are responsible for the flow of information, and to encourage ownership of the system. It should also help to prevent breach of confidentiality. Advice on these procedures will be gathered together to form a code of practice governing appropriate conduct for the appraisal of teaching practice.

CONCLUSIONS

It is useful to draw some conclusions about this pilot in relation to the wider concerns expressed about teaching appraisal in the education literature.

It is becoming recognised that general criteria for effective teaching can be identified, (Ramsden 1991) yet it is important to realise that it is not wise to import wholesale criteria from one institution to another. Each institution has to develop its own specific criteria and on this matter we agreed wholeheartedly with Seldin's comment that "the success or failure of the colleague observation programme is contingent on the common acceptance by the observer and teacher of the appropriateness, reasonableness and fairness of the rating instrument and its implementation" (Seldin 1980, quoted in Weimer et al 1988).

We feel that observation can be used as a developmental process in encouraging good teaching practice but that the observation records should not be the only source of information about teaching practice considered in the appraisal interview. We urged appraisees to collect information themselves about their teaching from their students and colleagues. As with any evaluation system, there should be multiple sources of input.

We gained much good advice and examples of good practice from the literature on teaching appraisal in schools (Bollington and Bradley 1990), from management literature on the ways to give and receive feedback (Wood and Scott 1989) and from existing sources of advice on appraisal in higher education (Gibbs et al 1989). We recognised that in order to be valid, comment must be based on observation not inference and furthermore, based on what was specifically observed during the two sessions. It was important not to make generalisations about the quality of teaching from these two sessions.

We also felt that we proved that it is possible and useful to use appraisers outside the discipline areas of the appraisees and that their observations, although maybe different to a subject specialist's, were as valid. We felt that our system of monitoring and evaluation of courses provides us with other ways of checking the subject content of teaching.

There are also features of the quality of the feedback which we found to be important. Feedback must be based on behaviour rather than personality, or what the teacher did rather than what the teacher is. Feedback should also be specific enough to allow the appraisee to formulate an action plan for self development.

It is suggested that it is difficult to achieve inter-reliability between observers when many are used but we feel that it is preferable to disseminate good practice by using large numbers of appraisers rather than restricting the observations to a small group of appraisers, who may achieve high inter-reliability but at the expense of the feeling of ownership of the system which we want to encourage.

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29 Upward appraisal and its implications for higher education

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INTRODUCTION

A number of potential appraisers are available for an organisation to appraise its professional staff. These include self, peers, managers, internal and external customers, and subordinates. In this paper we examine the potential for the use of upward appraisal, that is the use of data generated by and from students, in the assessment of lecturer performance. It remains an issue for others to decide, posing some interesting questions for educational philosophy along the way, whether upward appraisal of lecturers should be classified as appraisal by customers or subordinates!

Upward appraisal is claimed to have many benefits for organisations. These include improving management style and people management, facilitating personal development, increasing productivity (Bernardin and Beatty 1987), enhancing the recruitment attractiveness of the organisation, and facilitating "voice" (Bernardin 1986) within the organisation. It is also claimed to have many advantages over traditional appraisal schemes. Firstly, by the very nature of their relationship students are usually in much greater contact with the lecturer than the line manager. They are thus in a good position to observe directly a large volume of lecturer behaviours. Secondly, such observations are from a unique vantage point - "the receiving end". Thirdly, it offers a multiple source of appraisal data. Lecturers have many students but usually only one direct line manager.

Performance appraisal generally in the education sector has been particularly underdeveloped compared to industry. However, it seems that upward appraisal is one area where education has clearly led the field. For example, one study of the appraisal of lecturers in a UK university found some 29% of lecturers had experienced the use of information from students as part of an appraisal of their course/teaching (Rutherford 1988). The use of student evaluations of lecturer performance has a long history of attracting the researcher's attention (eg Breed 1927).

Although many aspects of student appraisals have been researched, there appears to be a number of "blind spots". Firstly, the studies have neglected the effects of upward appraisal of lecturing performance on the commitment of the students to their studies, course, institution etc. Secondly, the effects of upward appraisal on the lecturer's commitment and morale remain unexamined. Finally, most of the research that has been conducted is for research purposes only, yet it seems that appraisals differ markedly between the laboratory and real life (Banks and Murphy 1985).

Our study of student appraisal of lecturer performance within a Business School seeks to address some of these issues. We have examined, via the use of semi-structured interviews with lecturing staff, their experiences and perceptions of the use of appraisal data generated by students. We seek here to answer a number of questions about the use of upward appraisal for lecturers. How "acceptable" to lecturers is the use of student generated data in the appraisal process? For what purposes can student generated appraisal be used? Who should have access to the data? What are lecturers perceptions of students as fair and accurate raters of their performance? What are effects of upward appraisal on lecturer and student morale and commitment?

METHODOLOGY

The QUALED pilot study, described below, identified the existence of gaps between students' and staff perceptions of attributes of Teesside Business School (TBS), and between staff and student expectation and perception of the activities of the School. It is argued that the existence of these gaps is of cause for concern as it is a source of dissatisfaction with the services provided.

The objectives of the current study were to use the following criteria to measure the quality of educational provision: the concept of a gap analysis between perception and expectation of higher educational service; the ten dimensions of reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding, and tangibles: the concepts of the SERVQUAL model as developed by Parasuraman and Zeithmal (1985).

SERVQUAL was originally designed to assess the provision of services within the service sector. In effect it consisted of a 22-item, seven-point Likert scale. It was felt however that not all of the questions were directly applicable to higher education. A 35-item, seven-point scale was chosen.

The questionnaire had three sections. The first section contains a series of questions relating to the normative expectations of quality provision in the TBS. The second section contains a series of questions relating to the perception of quality of services provided by TBS. The third section was designed to provide demographic and other data from the respondents.

Although the items of the first and second sections were similar, as indicated above, the directions in each of the sections were slightly different, in that in section A respondents were asked what they expected in regard to each item, whereas in section B respondents were asked to report their perception of the quality of service received on each item. To all intents and purposes this framework is not dissimilar to that chosen by Parasuraman, or that chosen by Saleh and Ryan (1991) in a subsequent adaptation of the SERVQUAL model to the hospitality industry.

The sample consisted of 17 TBS staff and a cohort of 120 students on a BA (Hons) Business Studies degree. The questionnaires were completed by the respondents in the presence of, in the case of staff, student researchers, and in the case of students, the first author in a time allocated as a teaching period. The sample of 137 was comparable in size with other similar studies, Parasuraman and Zeithmal (1985) and Saleh and Ryan (1991). The survey was carried out over a two week period in February 1992.

For this pilot study, our main concern was to provide a preliminary analysis that would test the hypothesised ten dimensions of quality derived from the SERVQUAL model. Factor analysis of the 35 items in the questionnaire (a principal factor analysis using an oblique (oblimin) rotation) revealed, however, only eight applicable factors for both expectation and perception of provision. It also indicated that these factors, in both cases, accounted for only 50% of the variance, and that the items relating to each of the SERVQUAL dimensions were spread across the factors.

We need to investigate in more detail the measuring instrument. Considering that the questionnaire items were derived directly from the work of Parasuraman, it may be that they are not directly relevant to the higher education sector and will need further revision. Indeed, Parasuraman's ten dimensional hypothesis of service quality may not be directly applicable to issues of quality in HE. As regards methodology, when applying factor analysis, and considering the number of items used, a much larger sample may be required and a "test/re-test" design may be more effective in distinguishing between expectation and experience.

FINDINGS

Firstly, it seems the majority of lecturers are in favour of using student generated data in appraising their performance. A number of these, perhaps to be expected in a Business School, expressed their approval couched in a language of customer care. For example, lecturers felt upward appraisal could measure "customer satisfaction", "client approval of the service provided", and provided a "key to delivering a quality product". One lecturer suggested that such a source of appraisal data was more valuable than that provided by his line manager because "the customer is always right whereas the management here very rarely ever are".

Particularly emphasised by those lecturers in favour of upward appraisal was the value to themselves of student feedback for personal development. A number of those interviewed stressed the value of student appraisals in providing a source of feedback on teaching behaviours they were completely unaware of. For example, one lecturer described how a student evaluation questionnaire had brought to his attention that he spent much of the time in lectures looking out of the window rather than at the class and that this was interpreted as a sign of his disinterest by the students. Thus upward appraisals possess the valuable potential to allow us a view of ourselves as lecturers as others see us.

A small number of lecturers were on the other hand opposed to any use of such data in their performance appraisal and indeed to upward appraisals being conducted at all. A range of reasons were offered for this. Prominent here was a fear of what was described as the "get even factor". Lecturers were concerned with disaffected students, for example those who had scored badly in assessments, those who had personal grudges etc, using the vehicle of upward appraisal to give damaging and unfair ratings of their performance. One lecturer described how she felt upward appraisal would encourage students to become "over-litigious against some members of staff" and would thus "spend their whole time complaining rather than biting the bullet and getting on with it".

A number of lecturers appeared to be "casualties " of the upward appraisal process. One lecturer described the damage to his morale and commitment to lecturing as a career that had been caused by previous "maulings" in student evaluations, so much so that a change in occupation had been seriously considered. Another lecturer described how he felt student evaluations he had personally experienced reduced to little more than "popularity contests". They were considered as "providing an ego boost for some but the death knell to others".

Another concern with using students as appraisers was that students have only a partial viewpoint and knowledge of the role of the lecturer and that upward appraisals should be carefully restricted to areas such as delivery, assessment, lecturer availability, approachability etc. A common view was that the criteria used in student evaluations needs careful design, and it rarely receives this. Course tutors, those usually responsible for the design process, often used questionable evaluation instruments, usually obtained from prescriptive publications with very little consideration of customisation for the particular group/course to be surveyed. A further worry was that many instruments measured little more than lecturer "entertainment value".

Lecturer acceptance of the use of upward appraisal declined dramatically for purposes other than developmental activities, for example reward systems or promotion. When questioned on the acceptability of its use for forming a data source in formal "evaluation" type appraisal interviews support was much more limited. However, given such a position lecturers were generally fairly open about who should have access to upward appraisal data. Only a minority of lecturers thought it should by restricted to themselves

and their immediate line manager. Over half of our sample felt such information should be available to course boards and higher levels of management.

Some concern emerged with how this information should be presented to course boards. One lecturer described what he felt was a rather insensitive handling of student evaluations where the results were aggregated and an overall rating was tabled as a standing item on the course board agenda. This practice caused particular concern as this very public arena was the first time that lecturers had access to what were occasionally very poor ratings.

Interestingly from our findings, lecturers appeared to be more willing to share the data from upward appraisals with managers rather than students. A number of staff felt that none of the results of upward appraisal should be reported to students. Only half of those interviewed thought debriefing sessions between lecturers and students post appraisal was a useful exercise. On probing this issue, a prominent concern here was that staff would be put into an embarrassing position in such debriefings if students had rated them badly, rather than a lack of their value.

The reporting of upward appraisal results back to students was found to be very limited in practice. Generally it seems that although a substantial amount of upward appraisal existed in the Business School, on only one course were the results found to be reported back directly to the students. No examples of systematic briefing sessions with students using the data generated by upward appraisal were found.

CONCLUSIONS

Over 70% of our sample had experienced upward appraisal by students within the last two years. A number of concerns emerge from our preliminary analysis. Firstly, it seems little thought is given to the design of the upward appraisal instruments used. A number of criticisms could be made about the psychometric and other properties of many of the instruments used for upward appraisal found in this study.

Secondly, it would seem that the education sector could learn from industry's use of upward appraisal in a number of areas, not least in feedback to those who provide the data. Here industrial practice often encourages, in a few cases this is compulsory, those being appraised to conduct face to face debriefing sessions with the appraisers (Bernardin 1986). Such debriefings have the potential to be a very valuable developmental activity but need to be conducted with care. Here industrial practice emphasises the need for skilled facilitators in debriefing sessions. Upward appraisal, as practised in the higher education sector, seems to generate a rich source of data but organisations do very little with it. Our argument is that upward appraisal should be integrated into and inform decision making on the broader learning and teaching practices of the institution via incorporation into a student Personal Development Portfolio (PDP). Currently two of the authors are developing a model that will achieve this.

Finally, although space has denied us the opportunity to examine the impact of upward appraisal on student commitment and morale there is some evidence that this is far from clear cut. Indeed, similar to the effects of other sophisticated interventions that are designed to increase commitment, student appraisal of lecturers may paradoxically actually decrease it (Bushardt et al 1991; Illes et al 1990). For example, one of our preliminary findings is that students who had been involved in a number of lecturer/course appraisal activities over the first two years of a three year part-time course were increasingly reluctant to participate in such activities in their last year and some refused completely.

Two main reasons were given for this. Firstly, they felt strongly that it reduced to little

more than a paper exercise. No feedback to them was given on the results of previous reviews, nor did any positive action seem to ensue. One of their measures here was that the lecturers they had complained about and given very poor ratings to were still lecturing them. What is more, they continued with the same bad practices as before. No improvements could be discerned. Further, a number of lecturers had, in the words of one student, "got the hump" about the ratings they had been given and reacted "petulantly".

A concern of some of the students was that following what were obviously very negative ratings (they could only assume this as no formal feedback was given to them), a number of lecturers were perceived as apparently retaliating by setting more work, more difficult assignments, and giving lower grades. Given that upward appraisal had resulted in no noticeable improvements and a perceived retaliation by lecturers it would be no surprise to find a reduced student commitment and morale. Again, the potential to prevent this negative impact of upward appraisal on students may derive from the use of a PDP mechanism that integrates them into broader decision making.

Finally, one thing is evident from our preliminary analysis. Although there is a considerable amount of research on the upward appraisal of lecturers, much of this has been for research purposes only and concentrated on the more "technical aspects". Clearly there is a need for a broader based approach that examines the impact of upward appraisal on practice before whole-heartedly recommending its wider adoption as a mechanism to enhance quality in higher education.

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30 A total quality approach to managing CBT development

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INTRODUCTION

A "total quality" approach to management of instructional development has many complex elements. Essentially, quality management involves (a) defining a quality-level bracket, (b) improving the quality of the product within that bracket, and (c) reducing the cost of production.

Our full model of quality management for an organisation reflects four levels of information that are integrated horizontally and vertically between and across levels: strategic (used by senior management), tactical (used by middle management), supervisory (used by lower management) and functional (used by operational personnel). Originally developed for large publishing companies, it is now being adapted to CBT in an Instructional Design Quality Management Manual.

Here we present techniques for quality management that can be implemented at a tactical level or lower. That is to say, we provide a model and methodology that could be implemented at the level of a training division or department, even if a commitment to total quality management has not been embraced at a higher, strategic level by the organisation as a whole.

The paper discusses techniques and approaches for reducing cost (including scheduling approaches, estimating, job and version control, developing benchmarks, reducing cycle time), improving quality (robust design, pre-design, concurrent engineering, design for production, rapid development) and assessing quality (quality indicators). Specific illustrations of the application of principles and methods of quality management to development of computer-based training are provided.

IMPLEMENTATION

There are as many models of total quality management as gurus. However, you can design your own program. In fact you will have to do this, anyway. Each organisation requires a unique solution. The methods and procedures presented below are thus a shopping list, to help you get a quick start at the departmental level. They may not all be suitable to your circumstances.

Another important consideration is that implementation may take years (typically two to five). Progress may wax and wane during this period. Initial results may even be confusing (Sutton 1991). To see a program through these difficult times, senior management must have total commitment. Some of the common reasons for failure are (Bellis-Jones and Hand 1989): inadequate resource levels; poorly designed procedures; inadequate documentation; lack of training; inadequate supervision; poor documentation; poorly motivated staff; changing priorities; and poor supporting computer systems.

Other researchers have reported these barriers (Keys 1991): lack of use of Theory Z in human relations; lack of total employee commitment; attempting to produce at capacity; excessive emphasis on short-term profits; and outdated cost-accounting systems.

Most of the available models of implementation focus on manufacturing (Albregtse et al 1991). Applying TQM to services is more difficult, nonetheless it is applied successfully in projects and service industries, including educational instruction.

Here we look at some methods for local implementation at the departmental level, based on SWOT analysis, an improvement and an implementation strategy (Edosomwan and Savage-Moore 1991).

SWOT Analysis

Develop policy and procedures to prepare an annual departmental marketing audit, using an analysis of Strengths and Weaknesses, Opportunities and Threats, and Issues. Strengths and weaknesses are internal factors that may or may not be within your control. Opportunities are external factors frequently outside your control. Threats and issues are posed as questions to stimulate discussion.

Improvement Strategy

Develop an improvement strategy for the department based on:

- activity analysis
- customer identification
- process improvement

Do a global optimisation of the department by defining core, support and discretionary activities. Core activities, the reason for the existence of the department, use group skills to add value to the business. Support activities clearly support core ones. Discretionary activities are all of the running around necessary to get things done. Use time cards to determine where effort is spent. Analyse the results to determine how to reduce time on discretionary activities. Typically efficiency improvements of 10-20% are possible (Bellis-Jones and Hand 1989).

Identify the external customers of the department. In the case of a CBT department, these are likely to be other departments. Find out exactly what these customers want or expect. Then work backwards within the department, identifying internal customers. Each worker is a link in a chain of customers that ultimately leads to the external one. Each link is at once a customer to one other link and a service provider to another. Focus on the interface between links. Find out what internal customers want by asking them questions like, "What do you need from me, How do you use my output, How can I improve my service to you, Am I providing things you don't use" (Lee 1991).

Finally, develop a plan to implement a program of continuous process improvement (CPI), perhaps using some of the methods discussed in this paper.

Training Needs

Assess training needs. Train supervisors and workers in how to measure quality and implement quality programs. Focus on creating an environment where change and innovation come naturally. Encourage adoption of the most current proven tools (Vesey 1991).

Implementation

To implement the CPI plan, set up a departmental steering committee. The purpose of the committee is to identify quality projects or problems. It uses various analytical techniques

to decide which project or problems it should undertake. The committee establishes quality teams to analyse and eliminate the problem (Nandyal and Welch 1991). The findings of teams are binding on the committee; otherwise the exercise is pointless. Teams focus their discussions in the context of tools like quality function deployment (QFD) and fishbone diagrams, thus avoiding encounters that turn into gripe sessions or are otherwise counterproductive.

COST REDUCTION

The procedures below are presented in a rough order of implementation. Having workers do run diagrams, for example, while interesting will yield few benefits if there is no overall quality framework in the department. On the other hand, error review can be implemented readily without a framework. Similarly, maintenance, safety and security, job and version control are basic organisational needs, presented here to reinforce the idea that every aspect of an organisation has cost and quality implications.

Some companies, for example, even stipulate the maximum number of allowable rings before someone answers the telephone. Again, it must be stressed that these are ideas for consideration and may or may not suit your organisation.

Maintenance

Develop procedures for engineered maintenance cycles for facilities and equipment. Do equipment maintenance in off-hours. Keep equipment in perfect condition.

Safety and Security

Develop procedures for safety and security. Include virus protection and backup and archiving procedures for computer systems.

Job Control

Develop procedures for assigning docket numbers as the primary job control. Use a mnemonic plus numerics. Use a checksum with numerics. Design information systems to check mnemonic against customer lookup table, and to check numerics using checksum.

Version Control

Develop policy and procedures for version control. In most cases a manual or sequential change model is sufficient. Where multilingual products are developed, a selectable change model may be required. The sequential model manages files, filenames, file-version names and the sequence of deltas that make up a file version (Cronk 1992).

Suppliers

Develop procedures to purchase products like diskettes from companies that certify quality at the source. If not, develop procedure to inspect goods immediately. Report

defects as soon as possible. Develop procedures to use economical order quantities based on available discounts and inventory costs.

Undercapacity Scheduling

Use undercapacity instead of capacity scheduling. As its name suggests, it schedules somewhat less than a maximum daily workload. For example, if there are 7.5 hours in the workday, you might schedule just enough work for 6.75 hours.

The basis of undercapacity scheduling is to give workers enough time to do the job the right way the first time. This avoids costly re-runs due to errors. Also aim to do the same amount of work each day.

Undercapacity scheduling also allocates time for training and problem solving, and is thus key to quality management.

Adopting undercapacity scheduling may be difficult psychologically for supervisors and managers who feel they must run a tight ship. They keep the pressure on, and have difficulty understanding that undercapacity scheduling actually increases annual throughput. A production group producing a consistent, predictable amount each day will outperform one using capacity scheduling.

To achieve undercapacity scheduling, use a Master Production Schedule having three divisions: master schedule, actual demand, and available-to-promise. Set up the master schedule based on forecasts. As orders are booked, enter hours for each job under actual demand and compute the difference between forecast and demand. The difference is available-to-promise to user departments. Knowing the available-to-promise obviously helps the scheduler. It avoids false promises and the inevitable user dissatisfaction they entail.

Lot Size

With undercapacity scheduling in place, gradually reduce the lot size. Instead of giving a worker 100 frames to complete by a given deadline, give him/her 20 frames and a shorter time frame. This increases the required supervision but benefits include less pressure on workers, hence higher quality, faster feedback, and increased flexibility. If one station frees up earlier than expected, work can be redirected.

Cross-Training

To enhance flexibility and productivity, cross-train workers in each other's job. For example, with training, graphic artists instead of the instructional designer can specify graphic requirements. Cross-training of this type may be increasingly necessary with multi-media, where Renaissance-type instructional designers may be rare (see Training and the Development of ISD Expertise, below).

Set-Up Time

Investigate and improve setup time. This is the time necessary to setup for a job or particular kind of work. The ideal is one-touch setup - one button to push. Reducing setup time cuts costs through increased productivity and increases flexibility.

Just in Time

As lot sizes are reduced gradually, move to "just in time" (JIT). JIT exposes problems, and enforces problem solving. Normally managers build extra inventory and put slack time into schedules to compensate for known problems. Slack time is a common practice in project management for CBT. Eliminating these buffers reduces overhead and associated costs. It exposes problems, forcing you to find remedies. This improves quality, reduces waste and re-runs and lowers work-in-progress inventory carrying costs (Alonso and Frasier 1991).

For example, when schedules are not being met, the tendency is to release jobs early, in the hope that somehow deadlines will be met. In practice, the customer will use the extra time to issue change orders, increasing the uncertainty in the schedule, causing the system to become chaotic.

JIT principles can also be applied to project management, reducing project life cycles. Any management practice that shortens the planning horizon improves project profits (Alonso and Frasier 1991). Planning frequently (i.e., monthly) increases the accuracy of forecasting and scheduling. In one case, "simultaneously improving all of the delays and goals under management control [benefited] the client's net cash by over 13% of sales" (Alonso and Frasier 1991).

Scheduling

There are various approaches to scheduling, but the bottom-line objective of JIT is a zero deviation from schedule.

Use backward scheduling for periodical work or work by appointment. It starts with the distribution date then works backwards to arrive at the date when files must be delivered to the production department.

Use forward scheduling for services on demand, i.e., rush jobs. Calculate forward schedules from delivery of raw data or the time at which personnel will be available to work on the job, to arrive at the delivery date/time. Rush jobs may not affect mainstream CBT activities but may be a factor in related service departments.

Synchronised scheduling is a variation of backward scheduling. The final assembly date establishes the schedule for subprocesses, using standard offsets for lead time. Base the off-sets on production benchmarks. When calculating lead-time, consider these elements in descending order of significance (queue time often accounts for 90%) (Schonberger 1985):

- queue time
- run time
- setup time
- wait (transportation) time
- inspection time
- move time
- other

Whichever technique you use, the resulting schedule must be regular. If it is, you can then aim to reduce the required time project by project. The scheduler must keep a close eye on work in progress (WIP), to avoid unnecessary levels or capacity scheduling. This improves service by reducing queue time, responding more quickly to users, reducing uncertainty in schedules, and giving users more reliable status information. As lead times

shorten, forecast accuracy improves. There is less need for shop-floor control by schedulers and supervisors.

Obviously there are practical limits to reductions in WIP. There should be enough jobs to keep work centres busy. Loads at work stations will vary. There is pressure to overload some to avoid underloading others. However, increasing the workload will only increase queue times, making schedules less realistic, with all the chaos and inefficiency that implies. Another difficulty is that it is often hard to predict queue times for any particular job. It may queue at several workstations before completing its routing.

Like forecasting, scheduling is necessarily inexact. For example, vacation periods are usually unknown. Personnel book off sick. Customers miss deadlines. Nonetheless, scheduling is necessary and the key to strategic planning, eg:

- changing procedures
- modifying production methods
- introducing new technologies
- assessing resource requirements
- forecasting budgets

Good practices make it easier to meet schedules. First identify the key success variable for your operation (eg. on-time delivery) and design a system that produces the required results. Re-assess this key variable from time to time.

Calculate the daily capacity of your production centre in hours rather than production units such as frames. Determine the effective capacity using a formula such as:

Effective daily capacity = ((H-L)/H)(HxSxE) where:

H = normal hours in a day excluding lunch, breaks, etc.
S = number of shifts in a day
E = number of employees
L = loading factor for undercapacity scheduling (eg. 0.5 hours/shift)
((H-L)/H) = undercapacity factor

When drawing up schedules, be aware of pre-established commitments for regular jobs. Make allowances for rush jobs, using estimates based on historical data. Schedule rush jobs separately from regular ones. Consider doing rush jobs, altogether, every day at a certain time. Use simpler control methods for rush jobs and charge them out at cost-plus. Use a quicker invoicing procedure for rush jobs.

Also estimate expected sickness and absentee levels from historical data and maintain a list of part-time employees. Encourage employees to post their vacation periods as early in the year as possible. Schedule regular preventive maintenance, preferably in off-hours. Schedule to avoid known bottlenecks, levelling peaks.

Understand and exploit the paradoxes. When schedules are irregular, there is a tendency to rush jobs into production as soon as possible, in the hope that they might be completed on time. Conversely, make it a rule to release regular jobs into production as late as possible, ie. just in time. This reduces the chance of late changes. Before releasing a job, be sure all information is complete and all components are available. If the job is incomplete, set deadlines for the supply of missing information. Charge for last-minute changes to jobs based on accurate records of time and materials.

Update your schedule using information from time sheets and observation. Use flexible production, changing from single to partial or full second shifts as necessary. Determine economical breakpoints between the various options. For example, use temporary labour

for the first 5% of extra work, use overtime for the next 5%, then reduce customer service by rescheduling if you can't justify a full second shift.

Estimating

Develop a policy to base customer charges on estimates instead of actuals (excluding change orders). This enforces problem solving if jobs cannot be completed within estimates. Develop a procedure to base estimates on benchmarks and the depth of design. Develop procedures to place estimates on dockets (Ziegfeld et al 1985). This contracts workers to the production budget and also encourages faster feedback, allowing them to renegotiate the contract if they believe the estimates are unrealistic.

Benchmarks

Develop production standards or rates for all of the various parts of a job. Use work measurement techniques such as statistical sampling, stop-watch studies, and tables of industry norms. Develop procedures for devising and monitoring internal benchmarks for activities like writing, graphics, programming. Use meaningful time frames for benchmarks. For example, it may be unrealistic to expect a writer to do 1500 words/day but realistic to expect 7500 words/week. Don't base benchmarks on completed components such as frames/day, pages/day, etc. Review benchmarks monthly.

Depth of Design

An important consideration is the depth of design (good-enough factor) the customer requires, eg. a Chevrolet or a BMW. Many CBT projects are budgeted simply by working backward from the customer's budget. If he/she wants three hours of courseware for $30,000, and the instructional company charges $60/h, then the depth of design is 200:1 hours. This is fine if the customer truly understands what 200:1 means, or if 200:1 is good enough. Use QFD to determine customer needs and depth of design (see IMPROVE QUALITY); use simpler measures such as reverse calculation only for reality checks.

Cycle Time

Reducing cycle time (also called time compression management, time-based competitiveness and time-based innovation) for products or projects, a quality method in place in Japan since 1981, delivers major financial benefits, while allowing rapid response to changing market conditions (Musselwhite 1990). It is closely allied with concurrent engineering and JIT.

Shorter cycle time, a response to quickly changing markets, gives quicker market entry, allows organisations to charge a premium price for new products, reduces costs and improves quality (Musselwhite 1990). It creates opportunities to increase market share, market leadership and profits (Vesey 1991). An additional benefit is that turning over projects more rapidly increases contact with the market and increases the rate of learning within the organisation.

Cycle-time reduction cannot be implemented incrementally. Incremental change is efficient in building tools, like supporting computer systems, but will not significantly affect cycle time.

Major gains are only possible through process elimination and innovation, especially at boundaries between departments. At this level there are two primary objectives: speeding new products to market and quickening response to customers in production and delivery (Sheridan 1991). Set targets like reducing cycle time by 50%. One very interesting approach is to concentrate on the time to break-even, rather than the entire product or project cycle (IM Management Roundtable 1990). Break-even time encompasses all cash flow from a project and incorporates the entire development process from concept to sales (Inglesby 1991).

Start by speeding up existing processes as much as possible (eg. use E-mail). This gives faster feedback, too, so problems are dealt with promptly and customer satisfaction is increased. Next, re-design the existing process, through organisation and procedures. Supporting business and computer systems must evolve simultaneously. Scalable solutions based on open systems are a prerequisite. They must be built with fourth-generation languages not aligned with any platform, operating system or database. The underlying data model must permit long-term growth of the department's database (Inglesby 1991).

IMPROVE QUALITY

House Style Guide

Develop policy and procedures for creating and maintaining a house style guide. Develop procedures for customising the guide to meet individual customer/project needs. Incorporate the guide into style sheets and templates linked to authoring tools.

Glossaries

Develop procedures to build and maintain glossaries of nomenclature peculiar to the fields your organisation services.

Control Points

Make every workstation a quality control point, reducing the bad product passed forward. Develop check lists for each station.

Immediate Evaluation

Evaluate every module right after it is completed. Develop automated shells that completely compile CBT programs overnight, so evaluators have the latest version each day.

Make everyone responsible for quality: give each worker responsibility to flag defects even if not in their area of responsibility.

Defect Review

Develop procedures to trace defects to their source immediately upon detection. The purpose is to devise a system improvement - not to blame the individual. Where defects are not found out until a later process, or until the customer uses the product, provide fast feedback right to the originators.

Defect Correction

Make every workgroup responsible for correcting its own defects. Sometimes imagination is required. At a car factory in Canada, the purchasing department bought the wrong size of tires. They were mounted on 50 cars before the defect was caught. To correct the defect, the entire purchasing department was mustered in the parking lot to change the tires, using the standard tools found in the trunk.

Internal Customers

Develop a policy making each individual/group a customer/service provider to other individuals/groups.

Internal customer service items: develop a procedure for defining internal customer requirements and a related benchmark and/or checklists.

Pre-Design Planning

Invest in pre-design screening, evaluating and planning. The larger the design project, the more important the planning phase (Ziegfeld et al 1985). As a rough guide, aim for distribution of effort like planning (40%), CBT design (25%), process design (15%), production, test, delivery (20%). Obviously distributions like this cannot be achieved with traditional ID and CBT methodologies.

Quality Function Deployment

QFD is a set of planning and communication routines that facilitate concurrent engineering and give focus to meetings of quality teams. It assumes that marketing, design and production people will work closely together from the first conception of a product. It allows organisations to learn from customer experience and to reconcile what customers want with what instructional designers can reasonably build (Hauser and Clausing 1988). The procedures in QFD are simple:

1. Develop customer attributes: find out what customers want, expressed in their own words. These items, typically 30-100 of them, are customer attributes (CA). They may also include demands of regulators (eg. ISO 9000, MIL specs). Some attributes may be gathered into groups called bundles.
2. Weight customer attributes: weight each attribute in percent, and place the data in a table.
3. Analyse competitive advantage: on the right-hand side of the table, place a perceptual map giving the customer's perception of your capability of meeting an attribute (a), compared to the competition (b). Rate attributes on a scale of 1-5 (5 = best). This may relate closely to the type of authoring tools used or the expertise of your instructional-design team. One impediment here is that many design organisations are largely tool driven, since few existing tools are modular or extensible in any significant way. Competitive advantage data is usually collected using marketing methods. Identify areas of advantage (plan to maintain them) and opportunities for improvement.

4. Develop design characteristics: along the top of the table, develop design characteristics (DC) affecting each customer attribute. A DC may affect more than one CA. Express design characteristics in quantifiable terms. Analyse carefully, brainstorm, avoid vagueness.
5. Assess design characteristics vis a vis attributes: determine what is the strength and direction of the relation between each DC and its associated CAs. Fill in the body of the table with this information, linking the DCs and CAS. Check for consistency between customer evaluations of CAs and measures of the related DCs.
6. Ascertain what are the interdependencies among DCs: set up a matrix depicting these relationships.
7. Assess design characteristics vis a vis competitive benchmarks: furnish objective measures for current DCs.
8. Set design targets: determine what are ideal values for the DCs.
9. Assess design targets vis a vis desired cost and quality levels: determine whether design targets are within the quality level required by the customer and the appropriate cost bracket. Refer to the matrix depicting interrelations among DCs for assistance in making decisions regarding trade-offs to meet these constraints.
10. Design development and production processes: establish development methodology and plan production based on target design.

Design for Production

Design CBT applications so a) they readily fit your existing authoring shells, and b) production can be automated as much as possible. If customers want features not readily accommodated by the shell, don't shoehorn the application. Extend the shell, or develop a new one. Use tools like HyTime, the SGML-based hypertext and multimedia structuring language.

Robust Design

Robust design (Genichi Taguchi methods) builds in tolerances for variables that are known to be unavoidable. Identify the controllable and uncontrollable factors in your production process. Optimise the controllable factors within a range that minimises any effect of the uncontrollable ones. Any deviation in quality, no matter how small, increases the product's ultimate cost, including warranty liability and lost customer goodwill.

Concurrent Engineering

Concurrent engineering is one of the prime tools for cycle-time compression. It uses cross-functional or multi-disciplinary teams to provide more effective product designs, design products and production processes simultaneously, reduce time to market and to link producible designs to highly productive processes (St. Charles 1990). Cross-functional teams work concurrently on all aspects of the project.

Traditionally CBT uses a linear process: research, product design, process design, production, sales and distribution. One department does its thing, then tosses the job "over the wall" to the next (Shina 1991).

This linear process has many review stages and is costly. Product is recycled often to correct errors or incorporate changes. Manufacturing studies have shown that 70-80% and 75-80% of production costs are locked in during the design stage (Creese and Moore 1990; Musselwhite 1990; Sutton 1991).

Concurrent engineering is similar to rapid prototyping except that it emphasises management as well as design skills, focussing on customer needs (Creese and Moore 1990). One of its benefits is that typically most design changes occur before production starts (Turino 1991). A useful aspect of rapid prototyping is to use automated shells to load all completed modules every night, so evaluators can work each day with the current version.

Concurrent engineering involves all departments simultaneously in a parallel process. Practice has shown there should be a minimum of five people on a team, to prevent one person from dominating. Such cross-functional teams have reduced new-product introduction time by 50-75% (Musselwhite 1990). According to Hauser, "...the use of interfunctional teams benefits design....[but] what should these people talk about? How could they get their meeting off the ground? This is where the house of quality (QFD) comes in," (Hauser and Clausing 1988) or the committee approach advocated by Nandyal (Nandyal and Welch 1991) [see IMPLEMENTATION].

Run Diagrams

Develop procedures for individuals to monitor their own performance using run diagrams. Identify and investigate system problems.

Technical Planning

A major strategic issue facing CBT organisations is responding to technological change. Research has shown that organisations having a high-level technology plan are more successful than others (ITAC 1990). A technology plan has many aspects.

Products can be brought to market very quickly by having three design teams simultaneously develop solutions, but deliver them to market on different time lines. In some large-scale CBT projects, this may be a means of version planning. An original product is delivered quickly to the customer; significant change orders are incorporated into V.2.n; meanwhile more sophisticated versions are in development.

The same model may be used in planning for CBT technology, in the sense of pacing the technology. An organisation producing text and graphic frames could plan to migrate to multi-media. At the moment, multi-media is expensive and suited only to certain training situations. However, as multi-media functions are incorporated into operating systems, the cost will decrease while user expectations increase.

One problem is that we get locked into the paradigm of existing operating systems. DOS users, and even Windows users, don't understand the seamless environment of Macintosh, and thus cannot envision the type of products it enables. Similarly, those of us who have not fooled around with desktop video cannot truly envision the applications it enables. The technology plan should therefore include a small budget for experimental technology.

PROCESS IMPROVEMENT

The previous sections of this paper have addressed techniques for reducing cost, improving quality and assessing quality. Many of the techniques and mechanisms (e.g., JIT) presented are designed to expose problems in the processes underlying design, development and production functions, as much as to reduce cycle time. The following sections focus in more detail on issues relating to the conception and execution of these

processes, with a view to making suggestions about how the cycle time for creation of CBT products might be compressed.

Time compression is a major topic in the current literature on TQM and industrial engineering (cf Inglesby 1991; Musselwhite 1990; Sheridan 1991; Vesey 1991). The advantages of quicker product delivery in a manufacturing context are obvious: there are potential cost reductions and the possibility of greater market share through touching the market first, or more often in a given time span. Shorter cycle time also allows for a more incremental approach to product development and innovation and this brings lower risks. The analogy between manufacturing and CBT development is not perfect, since in most cases CBT products are custom tailored solutions rather than mass market products. However, the benefits of time compression are still clear: instructional development is one area in which, paradoxically, advances in technology have had the effect of significantly increasing the time and costs associated with design, development and production phases.

There are two kinds of decisions which can be taken be taken with respect to time compression: total and incremental (Vesey 1991). Incremental decisions modify existing procedures to produce minor or modest gains in efficiency and time compression. Total decisions concern the radical redesign (or elimination) of processes and yield major improvements. Vesey reports a number of striking cases to illustrate the kind of impact total decisions can have. For example, the Ballistic Systems Division of Boeing Aerospace Corporation reduced design analysis from two weeks to 38 minutes.

Both kinds of improvements - radical and incremental - are discussed below. Arguably, CBT development has a great deal to gain from incremental decisions. Even in sophisticated manufacturing which involves intensive design engineering efforts, product design typically accounts for 20% or 25% (Sutton 1991) of the overall cycle. In CBT, design typically represents up to 75% (Merrill 1988) of the overall cycle. Putting aside claims concerning the complexity of instructional design and the ill-defined nature of instructional design problems, these comparative figures suggest that existing procedures have not been optimized.

Incremental Improvements

Areas where improvements can be made include: the management of information generated in design and development activities, the design and implementation of error-proof processes with automatic checking devices in all phases of ISD and production, the introduction of new approaches in the knowledge acquisition phase of ISD, the elimination of prototyping, the automation of portions of the ID and production processes, and explicit strategies to develop expertise among instructional designers.

Information Management in ISD

There are many kinds of information generated during CBT development relating to initial conceptualization, feasibility, planning, development, production, delivery and evaluation. These include: the results of task and content analyses, objectives and sequences, media selection and instructional strategies analyses; test item banks; syllabi or outlines; scripts, course and lesson design specifications; graphics and text components, libraries of computer code. This information is highly interrelated. In fact many categories are the direct result of a transformation process that takes another category as input: tasks are converted to objectives, objectives are translated into test items, objectives are sequenced into lessons, and so forth.

In small scale CBT development projects, with experienced teams, it is often possible to adopt a relatively informal approach to documenting the results of design and development activities and managing this information. In large scale projects, a systematic approach to information management founded on the construction and maintenance of linked databases associated with each stage in the ID process can provide efficiencies and reduce the risk of major, costly blunders.

1. In the first place, information retrieval capabilities associated with databases can be used to support (and in some cases, to automate) analysis and design. For example, a database which can provide information concerning the relative proportion of different kinds of objectives can facilitate the design of a generic lesson structure. Another example: information concerning redundancy of tasks across different jobs could result in a more rational approach to training which consolidated these redundant tasks in one package. From a "performance engineering" standpoint the same information might be used to redesign jobs and reduce the need for training.
2. Reports generated from databases can also assist in estimating production and development costs more accurately. For instance, a complete breakdown of objectives according to the media and instructional strategies selected for them will facilitate a more accurate projection of production time and costs. If it should prove necessary to compromise media or strategies selections, owing to constraints, then the same information will enable instructional designers to make the necessary adjustments more rapidly, consistently and rationally.
3. Linked relational databases ensure that design and development decisions are consistent across the ISD process. The database system can be designed so that a change in an element associated with one phase in the ISD process can result in flags being set against related elements that are products of other phases. A change in an objective, for example, would result in flags being set against related artifacts such as test items, graphics selection, strategy selection, sequencing information and so forth. Automating the regulation of consistency in the ISD process obviously has even greater benefits when the content is not entirely fixed or frozen at the time design activities are undertaken. This is often the case in large scale projects in technical fields, where development of systems operation and maintenance training may have to begin before all systems are fully engineered and in production. The implication for training development based on initial design engineering specifications is clear: there may be many revisions. Under this condition it is essential to have tools which can register these changes and maintain the integrity of the ISD process by identifying inconsistencies as they are introduced and by facilitating the process of rippling required changes through the various subsystems of the evolving instructional design. This use of instructional design databases to ensure consistency is also an example of the utilization of an error-proof process with automatic checking built in.
4. Finally, ID databases with automatic report generation that will track the degree of task completion for various phases can obviously be used for project management purposes and to assist in producing intermediate deliverables in the form of documentation of the various ID phases.

Barriers to Implementing Information Management Systems in ISD

Despite the obvious applicability of database approaches to managing development-related information in ISD, only a small proportion of commercial developers exploit the

possibilities. An informal survey of five Canadian CBT development operations indicated that not one employed database management systems (DBMSs) in the ISD process in a significant way (ie. in a way that links ISD phases and which exploits the potential of DBMSs for design decision support). Even in large scale projects, the operations surveyed routinely used DBMSs only for one phase (task analysis), and in some instances for project management purposes.

One reason for the limited use of DBMSs in ISD is the lack of commercially available, ISD-specific, applications. Commercially available authoring systems often include as an option a DBMS that can be used to implement computer management of course delivery ("computer-managed instruction") but they do not offer DBMS tools for ISD.

A barrier to creating custom DBMS systems in-house is the issue of the different requirements which would have to be addressed. Different phases of the ISD process require different kinds of interactions with information and correspondingly different forms of representation and different interfaces (Gibbons and O'Neal 1989).

In the analysis phase, for example, it is crucial that the developer be able to manipulate structural representations (course structures, lesson structures, unit structures) as well as the data associated with individual elements in a structure. In media selection, individual objectives are associated with ranked choices from among available media. With the kinds of analyses associated with this phase, wherein scenarios associated with alternative mixes of media are compared on the bases of instructional value and overall costs, a spreadsheet representation is more appropriate than a structural representation.

A fully integrated tool for ISD would thus have to combine flexible outlining functions with relational database capabilities, and ideally would also handle graphics elements as data. In addition, there would be requirements for handling multiple versions and possibly collaborative work (multiple developers). A tool with these features and suitable interfaces is feasible (at the boundaries of the current envelope of technology), but would require a significant research and development effort.

Knowledge Acquisition

Standard ID practice is based on a separation of subject matter expertise and pedagogical or instructional design expertise. Instructional designers work with subject matter experts (SMEs) to extract content, but apply their own expertise based on experience, instructional theory and instructional design models to make decisions regarding how to best structure and present that content. Knowledge acquisition is very often a major bottleneck in ID where complex knowledge or skills are concerned.

Traditionally, the central tools of knowledge acquisition (and knowledge representation) in ID have been procedural and hierarchical task analyses. One problem associated with these tools is that where cognitive tasks are concerned experts' knowledge is often highly proceduralized and telescoped, meaning that several explicit procedures have been collapsed into a single step. As part of the knowledge acquisition job an instructional designer working with a highly skilled SME must facilitate the explicit recall of steps or procedures that have become tacit or highly automated.

In a typical scenario, the instructional designer will observe the SME performing a series of tasks, or listen to an account of the performance of those tasks, and will prompt the SME for further details or explanations where these appear to be missing. This activity is time consuming and can be highly problematic, depending on such factors as the quality of communication between the SME and the instructional designer, the level of knowledge of the SME, and the fluency the instructional designer is able to acquire in the language of the SME's domain.

More meticulous and detailed approaches to knowledge acquisition and knowledge representation have emerged in the field of knowledge engineering (KE) which is associated with the development of expert systems, decision support systems and intelligent tutoring systems. Both KE and traditional ID use interviews and protocol analysis as their basic methodologies. The basic difference between the two concerns the emphasis in KE on how the expert structures his knowledge. Task analysis focuses on the tasks performed by an expert; KE also emphasizes the expert's knowledge base (which provides an explanation for why things are done in a particular way).

KE is even more labour intensive than conventional ID knowledge acquisition and representation and is warranted only when the instructional goals necessitate the additional effort (ie. when quality is defined at that level). However, having said that, it is worth considering whether any innovations in methodology that have arisen in KE could be transplanted to conventional ID practice to improve efficiency. KE is so time consuming that the impetus driving process improvement has been higher than in ISD. Since the basic methods are the same, many advances in KE would potentially be transportable to ID practice.

KE has taken two directions that are relevant. Both involve the attempt to transfer more of the effort in knowledge acquisition on to the expert. This makes considerable sense on an intuitive level, since the element contributing most to the bottleneck in knowledge acquisition is the instructional designer's ignorance of the domain.

The first approach attempts to eliminate the instructional designer's role, replacing her with a set of computer-based, possibly interactive, knowledge acquisition tools that the SME works with alone to build at least a first-cut explicit representation of her knowledge. In the area of knowledge-based systems development there has been some success in the strategy of providing shells to SMEs for producing rule-based systems. SMEs are then able to develop and test the rule base themselves, without the requirement of learning a complex language and programming environment.

Another example of this approach deals with declarative rather than procedural knowledge. Shaw and Gaines (1987) have developed a methodology which they call Personal Construct Technology (PCT). In the PCT approach, an SME begins by identifying all the major elements in the domain. This domain is then decomposed into all possible triads. The SME then is required to identify, for all triads, how two elements are similar and how they differ from the third. At the end of this process an exhaustive taxonomy of the domain has been produced and the categories or features that underlie the taxonomy have been made explicit. Shaw and Gaines have developed computer-based incarnations of PCT that will guide the SME through this process in an interactive mode.

PCT is very much a bottom-up approach, and real efficiencies in KE rather will likely come from top-down approaches which present a framework that can guide and focus KE activities in a given type of domain. Some work, such as Breuker's concerning generic models of diagnostic tasks, is being carried out in this direction (Breuker and Wielenga 1987). While results to date have not indicated radical breakthroughs, this would seem to be an area worth watching.

An alternative to approaches such as PCT which seek to replace instructional designers or knowledge engineers is one which utilizes SMEs to a greater extent in a number of variations on the standard approach to SME interviews and collection of protocols. In one such variant the knowledge engineer observes two SMEs who, in turn, pose representative problems and provide solutions for those set by their colleague, while the protocols are recorded. The technique is based on the premise that the task of defining a representative and comprehensive set of problems or scenarios usually can be carried out much more efficiently by two experts than by a SME working alone with an instructional designer.

Training and the Development of ISD Expertise

The knowledge acquisition bottleneck is one area where appropriate training can often play a role in increasing efficiency (Wielenga and Breuker 1986). Even those who have had formal schooling in ID have typically never received any specific training regarding knowledge acquisition from SMEs. There is reason to believe that training in a structured methodology for knowledge acquisition would improve the process.

Lack of general ISD training and related design experience is also frequently a problem in instructional development operations. Many instructional designers lack formal training in their field; those with formal training who prove to be very competent often move quickly from their roles as instructional developers to assume supervisory or management positions. In the area of CBT in particular, there are apparently only a relatively small number of designers and developers with significant work experience. In cutting edge areas such as multimedia systems and intelligent computer-assisted instruction the situation is even more serious: there is little cumulative knowledge and experience to draw on in attempting to formulate design theory and development methodologies. Such advanced areas also seem to entail redefinitions of the traditional roles of instructional designers.

Several responses to the problem posed by insufficient numbers of expert instructional designers have been advanced in the field of CBT development. On the one hand, there have been attempts to engineer systems with built-in expertise that might eliminate or at least reduce the need for expert designers. This is the thrust of the SOCRATES project (Doucet and Ranker 1990) and also to some extent of Merrills's IDexpert project (Merrill and Li 1989). IDexpert, the better known of the two, provides instructional design decision support and aims at a level of automation of CBT development through the creation of a series of "transaction shells," each of which is intended to handle a specific type of instruction by adapting reusable course component structures.

Conversely, some commentators have argued that the key to improved performance and quality in development must lie in developing appropriate skills in instructional designers. Duchastel insists that the instructional designers must be in "creative control" (Duchastel 1988). If you accept this position, the question becomes how one can develop that expertise as quickly as possible. In addition to conventional team-building strategies, technology can perhaps play a role here, also. Duchastel has argued that designers need to have access to their own design experience in some expedient fashion, as well as to the cumulative experience of design teams. Misselt (Misselt 1989) has similarly argued the need for a courseware design library and has provided some analysis of the characteristics required of such a library. Other, more explict strategies have also been explored. RRI (Research Reference Interface) is a component of IDexpert that provides "robust" explanations justifying the design prescriptions provided by IDexpert's instructional design engine (Li et al 1991). IDE is a hypertext-based tool that allows developers to record reasons and explanations for design decisions along with course content. It provides for the management (compilation and retrieval) of this information as well as the means to represent it in different ways. These capabilities facilitate group decision making, make developers more reflective through requiring an explicit statement of design decisions and their underlying rationale, and provide a database of design decisions and explanations from which to learn.

Cross training of CBT development teams is another area where gains can be made. Communication of requirements across functions will be facilitated if team members have a better understanding of the different tasks. Recent developments such as hypermedia and CD-I and DV-I applications require greater cooperation and collaboration among

team components, a larger, more central, role for graphics design, and a different, more creative (narrative), approach to course design. With this increased interaction among different functions, cross training may be especially beneficial. In some forms of development, cross-training has been shown to cut new product introduction time by as much as 50% (Musselwhite 1990).

What Do Instructional Designers Really Do?

ID theory is not an area of knowledge that is highly developed. While there exists a large number of procedural models, which are very similar to one another, for doing instructional design there is little research and hard data concerning what instructional designers actually do. The standard procedural models provide a general methodology for developing instructional artifacts; they do not address the specific strategies and tactics and representations that an instructional designer utilizes when performing ID tasks. Better understanding of ID as a design activity per se is needed if major breakthroughs are to be made. To date only a very little research has been carried out in this area (eg. Pirolli and Greeno 1988; Pirolli and Greeno 1990; Jonassen and Wilson 1990).

Eliminating Prototyping

ID is generally justified on the grounds of effectiveness, not efficiency, and it is well known that under normal "real world" constraints all steps of the conventional ID models cannot be carried out in the degree prescribed. Recent improvements in methodology have been made in CBT development by combining elements of rapid prototyping with some components of traditional ISD. Major gains in time compression can be achieved if the prototyping stage, which is itself highly intensive, can be eliminated.

Prototypes play several roles in CBT development: feasibility (a prototype can provide a very good sense of the total development effort required to produce the complete product, where new tools are being used and/or new designs are being implemented); verification of the effectiveness of the design (prototype evaluation with end users); communication of standards to production teams and agreement on standards with the customer. Ideally, prototypes should not play a role as a medium for extensive design experimentation, unless the context is R & D, rather than a CBT production operation. Properly exploited, prototyping eliminates any possibility of the need for expensive revisions arising during the production phase.

Elimination of prototyping as a major stage will only be possible when: (a) production tools allow for more modular construction of CBT, to facilitate revisions; (b) clients have greater familiarity with CBT and hence are more fluent in describing the quality level (instructional design features, aesthetic and functional characteristics) they require and better able to understand what they are being offered, and (c) our knowledge progresses to the point where cumulative experience, new procedural models, and detailed prescriptive theories can replace the role of prototypes in ensuring effectiveness.

QUALITY INDICATORS

A number of examples of quality indicators are given below. But don't monitor everything. Select a few indicators (or devise your own) that are meaningful and focus on them. Don't build a bean-counting bureaucracy.

Overhead

Develop procedures to monitor overhead as a percentage of processing cost (activity-based accounting). Take total costs for direct labour, materials, processing and overhead. Subtract labour and materials, and divide the balance by processing costs. Now for each project, multiply its processing costs by the remainder to get a contribution to overhead. Add project costs for labour, materials and processing to get total project costs.

Customer Turnover

Monitor the percent customer turn-over. Long-term customers are easier to sell on services, reducing marketing costs. A high customer turnover indicates dissatisfaction with quality in some sense.

Development Cost

Monitor the ratio of development hours to course hours. A decreasing ratio shows an improvement in quality, probably in the design process.

Unit Cost

Monitor unit cost. A declining cost indicates improvement.

Unit Effort

Monitor unit effort. A declining rate indicates improvement in cycle time. Monitor both effort and cost because in some cases effort may decline while cost does not (wage settlements may increase costs).

Utilization Rate

Monitor the job queue using the utilization rate, U = A/u, or percent of time busy. Utilisation rate is the ratio of the mean arrival rate of jobs (units/h) to the mean service rate. For example, an arrival rate of 2.1 units/h and a service rate of 1.9 yields a utilisation rate of 1.10. Anything over 1.0 means jobs cannot be completed during normal hours and overtime is necessary. A rate of 0.85, representing undercapacity scheduling, is suggested as an experimental target.

Cost Index

Monitor the cost index for a CBT project. It is the ratio of actuals/estimates. A value greater than 1.00 represents over expenditure and the need for corrective action.

Achievement Index

Monitor the achievement index. It is the ratio of actual percent complete on a project to the planned percent complete at any given time. A value less than 1.00 indicates underachievement, ie. the project is slipping.

Status Index

Monitor the status index. It is the ratio of the achievement index to the cost index. As a rule of thumb, 0.9-1.1 is a normal range, 1.1-1.3 and 0.7-0.9 requires management attention/action, >1.3 and <0.7 requires immediate management action (Gore and Stubbe 1988). Plot the cost, achievement and status indices on the same chart.

Change Orders

Monitor the number of change orders. A declining number shows an increase in quality in the design process.

Benchmark Trendlines

Monitor the trendline in benchmarks. A decreasing trend shows an improvement in quality. Note that by the time problems show up in trendlines, they may be fairly serious.

Break-even Time

Monitor the number of days to break-even on a given class of project.

CONCLUSIONS

We have presented a basic model for considering TQM. This should be regarded as a framework of interrelated considerations. The reader may select, at her own discretion, various elements or configurations of elements from among the various approaches and techniques that were outlined, to develop an approach that suits her particular organization.

However, in the last analysis any approach to TQM must be systematic and systemic. Several of the techniques which are discussed above will yield incremental benefits if introduced in isolation. These gains not only may be incremental but may also be transitory.

Those contemplating a move to TQM clearly do need to think carefully about the culture of their organizations with regard to innovation. The fullest benefits of TQM can only accrue when there is an organizational strategic commitment to the paradigm. However, much can be accomplished at the departmental level.

It takes time to successfuly implement TQM and entrench a philosophy of continuous improvement. The need to improve competitiveness, and initiatives such as the widespread adaptation of ISO 9000, will eventually force many organizations to make rapid changes that may be very disruptive and counterproductive; it is better to plan implementations now, to ensure success.

The concepts underlying the approaches encountered in TQM are comfortable ones to those in the field of instructional technology who have adopted a performance technology orientation - which deals with performance related factors in general, including job design, job support, technology, organization, procedures, as well as explicit training solutions. Training departments and organizations are thus perhaps in a position to lead the way in the introduction of TQM philosophy, principles and methods.

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31 Towards quality management in training design

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INTRODUCTION

An integrated quality management policy is applied throughout the training development cycle, using a consistent approach across all training media. This strategy is based on all-round commitment to quality and on sensitively defined standards. Quality management techniques and independent quality reviews and audits successfully complement established validation techniques. The paper outlines the development of the strategy, the skills and conditions necessary for its success, its benefits and its relationship to international standards, and includes a case study of the use of quality management tools in CBT courseware production.

Lloyds Bank Training Development Group (TDG) designs training for 35,000 staff throughout the United Kingdom, using both traditional and technology-based delivery methods. Quality management techniques, originally introduced in the development of computer-based training (CBT) and owing something to software engineering, have been successfully extended to other media.

The forerunner of TDG, Lloyds Bank Distance Learning Centre (Slade 1989) was rapidly expanding the production of CBT packages and courses to meet the needs of the Bank's Branch Information Technology (BIT) project, a major internal customer. Both design and programming of many courses were being subcontracted to external suppliers.

Project teams were following the conventional systematic training design process. A training requirements study led in turn to an outline design and detailed design. Then the programmer received a script specifying screen layout, content, program branching, course navigation, user interface and any other responses to student interaction. Staff external to the project approved the requirements study, and tested the completed course before its release, but there was no other independent review.

In pre-release testing, reviewers recorded observations on course design, content and operation. An unacceptable proportion of defects (defined as negative observations requiring re-programming) was occurring. These ranged from typographical and grammatical errors to serious software bugs, and included factual errors and perceived poor training design. They contributed substantially to project costs and delays in completion.

ATTACKING THE PROBLEM

A member of staff (the first author) was appointed, and given the necessary independence and authority, to tackle the quality problem. Technical problems that could only have been introduced at the programming stage were the most urgent and important, so a technical production guide (Lloyds Bank 1990) was developed to ensure that all concerned were aware of relevant screen design conventions and equipment limitations, and to facilitate communication between designers and programmers. Both internal staff and external subcontractors received copies.

In the meantime observations of defects were being systematically recorded, classified and graded according to criticality, later using Pareto analysis. This allowed informed decisions to be taken about which areas it was possible to standardise. Concurrently,

independent reviews were introduced on completion of critical intermediate stages in courseware development, such as the outline design and the programming script. These were intended to trap potential difficulties early enough to prevent their becoming expensive problems.

Thus the classic quality management techniques of process observation, event recording and design review were introduced.

DEVELOPING THE SOLUTION

As a means of specifying technical limitations the technical production guide was a success, but in non-technical matters it did not reflect a consensus of design views and so was not widely accepted. A parallel investigation of the difficulties of communicating design information (England 1990) showed that in a fast-changing field like training technology, individual projects might have to adopt their own conventions. It became clear that a standards-based approach to quality was valid but would succeed only if environmental influences were taken into account.

Time and cost, of development, observance and enforcement, compared with benefit, help to determine whether or not a standard is issued. So does demand, whether from designers, quality assurance (QA) or production staff. What any one standard covers is determined by delivery medium, demand and enforceability, while the principal factors affecting effectiveness are usability and acceptability.

As described above, the first effective standard, the technical production guide, was developed empirically. A pre-release review of a number of CBT courses revealed defects. Classification enabled attention to be given to critical areas and an ideal situation to be determined. Hence a standard for the critical areas could be defined and guidelines issued. The next step was assessment of subsequent projects against the standard.

Currently, when a new standard is required, an example of the item (process or product) concerned undergoes an initial assessment, by means of inspection, to determine what constitutes a defect. All observations are recorded. The resulting Pareto analysis leads first to revealing what needs standardising, and then to discussions with interested parties and the definition of a standard. Guidelines for new designers are then produced, to help them understand how the standard is intended to be interpreted and in what circumstances exceptions may be advisable. This cycle is repeated as many times as necessary.

The actions described - inspection, recording, analysis, addressing standards, producing guidelines, and assessment, re-inspection or validation - resemble the traditional courseware development cycle and also the classic quality control loop (Figure 31.1), with the assessor or tester being the sensor and the reference being the standard.

The review at each stage of course development is a logical part of the training validation plan which is built in to each project. It often uses familiar techniques like course piloting with designers' peers or with the target population. Assessment against a standard may be eased by using checklists and, sometimes, testing plans. It is nevertheless a task requiring a variety of well-developed skills and judgment in the assessor, depending on the medium used for the training. In most areas of training design there will be borderline cases, where technical infringements do not affect training outcomes or would cost a great deal to correct. However, each assessment should produce a record of findings, a correction agenda and a possible improvement action programme.

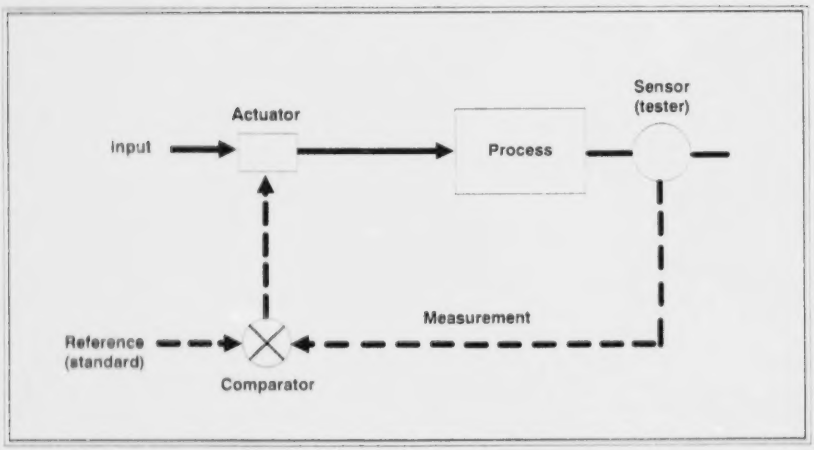

Figure 31.1 *The classic control loop*

THE ROAD TO SUCCESS

A combination of independent review and acceptably defined standards and well-presented guidelines thus form the foundation of a workable quality management system. Its success requires acceptability, independent assessment and a means of completing the improvement action loop.

Acceptability is assisted by involving project teams closely in the review process and in the definition of standards, and by ensuring that the reviewers are appropriately skilled. The standards themselves must be easy to understand and apply.

Independence is provided through the existence of a quality assurance team whose members, although Lloyds Bank TDG staff, are not members of project teams.

The improvement action loop is addressed by feedback meetings open to all design and production staff. These address specific topics and plan subsequent action, such as a project for writing guidelines.

QUALITY IN ALL TRAINING MEDIA

In 1991 Training Development Group extended its quality effort to media other than CBT. The techniques described above are now applied to all training design. Guidelines for writers and editors have been produced, and in early 1992 observation data was being gathered from classroom sessions in order to analyse the delivery of face-to-face training.

In the process of extending the system to other media QA staff acquired new skills, and began to be consultants to the four design teams, rather than inspectors. They need skills in writing, editing, proof reading, software testing and interface design, and observation, as well as in quality management. Coaching and giving feedback is important in the review process and good inter-personal skills are vital, as is a full knowledge of the training design and delivery process.

BENEFITS

Directly quantifiable benefits are discussed in the case study. Among the indirect benefits, the approach is extensible as required, uses many existing skills, can be incorporated into initial project costings and so can be closely monitored, is widely applicable and is sensitive to designers' feelings. External suppliers can easily be involved, without conflicting with their own quality systems. Quality audits can be incorporated, and vast amounts of paperwork are not generated. The visibility of the system is an encouragement to TDG's suppliers and customers alike.

Unlike the approach adopted in BS5750 (BSI 1987) TDG's approach is not wholly inspection-based and can be implemented fairly gradually in particular areas. Unlike the British Standard also, it is results-based rather than purely activity-based (Schaffer and Thomson 1992) as its primary focus is on improvement action, not fidelity to procedures alone.

CASE STUDY: USING QUALITY MANAGEMENT TOOLS IN CBT COURSEWARE PRODUCTION

Extensive data from the production and testing phase of CBT courseware development has been collated and analysed. The major source of quality problems have been identified by using simple statistical techniques. Designers and programmers have thus been enabled to improve quality by taking particular care in critical areas. The case study illustrates the benefits and problems arising from the previously largely untried use of quality management tools in developing CBT courseware.

The quality improvement process adopted during CBT courseware development consists of four distinct stages: identification, analysis, improvement via communication, and monitoring.

Identification

The identification stage can be the part most organisations find difficult to accept. The fact that the identification process is considered necessary indicates there are problems which need addressing, and there is thus room for improvement. As a corollary, this suggests that both processes and people will need to change which can be cause for significant resistance.

Accepting the sensitive position the quality assurance (QA) team are in, it is realised that it is not always "what you say" but "how you say it" that counts, and much effort is expended in this type of approach. For instance specific training on coaching and feedback techniques considerably assist this role. In TDG, designers and programmers want to produce better training material and are therefore willing to consider and implement improvement ideas. It is for these reasons QA can feel at ease in offering genuine remedies to common problems and remain confident in the fact they will be welcomed and implemented.

Many inconsistencies (observations) occur throughout CBT production, and the basic method of recording these is on a QA report form. The columns show the observation number (sequential), where in the course the observation occurred, what it was, and recommendations (if any). The "importance" column is described in detail later. The remaining four columns show the process of correction until final recheck by QA. The forms are not for the sole use of QA members as the designer or other interested parties

are actively encouraged to use them.

Each course will generate a number of these forms and therefore a significant number of observations. Following a "brainstorming" session the lengthy "classification of observation" list shown below was produced.

A Key Functionality (D)
B Key Functionality (P)
C Help (D)
D Help (P)
E Interactions ie questions (D)
F Interactions ie questions (P)
G Graphics (D)
H Graphics (P)
I Application Simulation (D)
J Application Simulation (P)
K Spelling and Punctuation
L Technical Accuracy
M Tutorial Text (D)
N Tutorial Text (P)
O Mouse
P Observation Readvised

These classifications are intended to cater for all possible inconsistencies likely to be encountered during production of a CBT course and, for clarity, have been assigned individual letters. The (D) and (P) refer to designer and programmer respectively.

Analysis

The analysis stage uses numerous quality management techniques to ascertain the extent (ie frequency) of the observations being made throughout course production, and identify major areas of concern.

A simple "tally chart" was devised to collate and classify the observations from three CBT courses, one internally designed and internally programmed (course one, released in 1989), one externally designed and internally programmed (course two, 1991), and one internally designed and externally programmed (course three, almost ready for release in April 1992). This revealed remarkable consistency in the distribution of different types of deficiency.

From the sample of observations from course one, the classification "M" ie Tutorial Text-Design provided the most frequent comments. This is where the programmer has correctly followed the designer's script but for example, a sentence or paragraph does not read correctly, and the observation is consequently highlighted and attributed to the text design. The next highest was the "K" classification (Spelling and Punctuation) with "B" and "F" classifications (Key Functionality - Programming and Interaction (Questions) - Programming respectively) also featuring highly. The latter two classifications refer to the usability of the keys for navigation throughout the course, and although the design script can sometimes provide incorrect instructions for the programmer, it is more often found that the observation relates to the programming related deficiency.

The second course included a "simulation" of the application as a method of testing the learning. This shows similar priority to course one in terms of Tutorial Text - Design but Key Functionality - Programming came second pushing Spelling and Punctuation into

third position. Understandably the design and programming of the "Application Simulation" also feature highly. Another interesting point is the appearance of Tutorial Text - Programming ("N") in fourth spot, as this indicates inability to reproduce the text on screen from the designer's script.

Course three, designed and produced most recently, again shows similarities to the other two courses. The spelling and punctuation has in fact reduced in significance but the appearance of the programming of graphics ("H") is now a feature. Being the first "Mouse" controlled course to be monitored the appearance of comments under classification "O" was, to a certain extent, anticipated. The latest classification added to the list (ie "P" Observation Readvised) was a direct result of analysing the QA report forms and noticing the recurrence of previous comments.

Understandably an abundance of information has been produced, which renders concentrating on many areas at once, totally impracticable. We therefore prioritised the observations in terms of frequency, which allows comparisons across individual courses. This was achieved with the aid of Pareto analysis.

The overall results from course three confirm the findings in terms of priorities mentioned above (ie M,B,N,H,O,K). We were also able to focus on the observations by importance as touched on previously in the "QA report form". Each observation is categorised in terms of importance as follows:

Category 1	Critical Defect	rendering release of course highly unlikely ie execution error (software failure) where the course has "crashed" and needs reprogramming, or where some text has been incorrectly keyed which could seriously inhibit the transfer of learning.
Category 2	Major Defect	making release unlikely but not impossible, ie key malfunction on one screen but fully functional elsewhere, or where a graphic does not hinder the learning but could be improved on, or difficulty in understanding how to proceed.
Category 3	Minor Defect	where release is still likely if insufficient time to correct, ie spelling or punctuation error.

Each level of observation is likely to be corrected before release, but this level of importance prioritises the work involved.

The analysis of observations by category assist the QA team in identifying where to focus attention. By analysing Category 1 observations only, we found the top three classifications all focus on programming inaccuracies.

Many more of these charts have been produced which gives us clear indications where to concentrate our initial efforts in order to make the most impact. Another technique being investigated is that of the "cusum" chart. This refers to the cumulative sum (hence "cusum") of observations found in a sample number of screens. In essence a reference or "target value" is subtracted from each successive sample observation and the results cumulated. Values of this cumulative sum are plotted and "trend lines" are drawn on the resulting graph. If this is approximately horizontal, the value of the variable is about the same as the expected value. An overall slope downwards shows a value less than expected, and if the slope is upwards it is greater.

Another technique is that of the "cause and effect diagram" (Ishikawa) as shown in Fig. 31.2, which provides an overall view of the processes that could lead towards a nonconformity report.

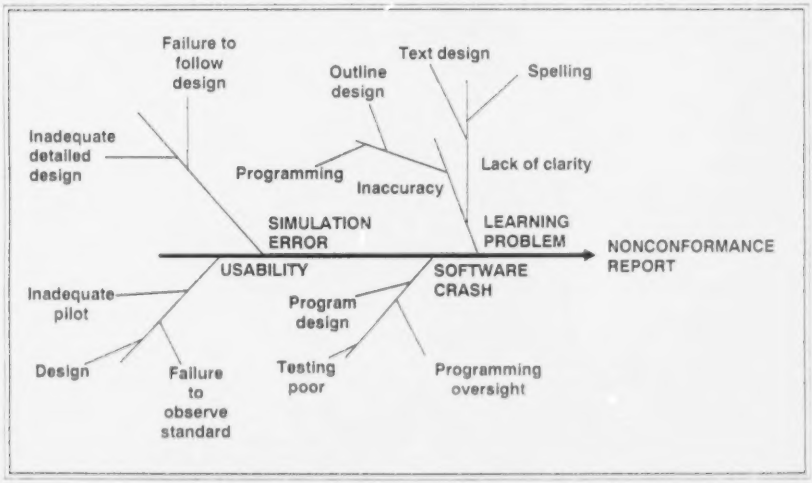

Figure 31.2 *Cause and effect diagram (Ishikawa diagram)*

Improvement Via Communication

As mentioned, it is not possible to improve all the problems at once, so we have tended to concentrate effort on a selection of the more important and frequent observations. The improvements currently being worked on or already achieved include:

Tutorial Text - Design ("M")

Improved reviews of designer's script. Many of the design observations should be picked up at the design review stage, as should Technical Accuracy ("L"). This would dramatically reduce the classification of observation list so that (ideally) only pure programming deficiencies remained.

Many reviewers find difficulty in visualising the paper version of text on a screen resulting in more comments when the material is later reviewed on the screen. This is being investigated by producing the pure script on screen but without the usual key functions so as to restrict comments to content, screen design and layout only.

Key Functionality - Programming ("B")

If the above were successful, much more could be achieved in this area by further developing tools such as "Fault Tree Analysis" (FTA's) which would help to pinpoint exactly why a programmer was allowing inaccuracies. It could be inexperience, lack of time, insufficient testing, etc.

The creation of a "shell" for navigation purposes (ie "Exit" key "Help" key "Next" key etc) will standardise the process, and significantly reduce this classification without stifling design.

Many courses are now becoming "Windows" based, and the use of the recorder function in "Windows" allows selected key presses to be automatically remembered and reproduced on demand. This encourages a more efficient testing process to be maintained, thereby increasing the speed of course release.

Spelling and Punctuation ("K")

This has been improved in recent courses by using a programming language that is able to import the designer's script thereby cutting the keying-in process by half (and consequently virtually eliminating Tutorial Text - Programming ("N") classification in the process).

These improvements are only likely through effective communication and a willingness to improve. It is up to QA to identify, analyse, encourage, support and coach so that both the training provided and the method of producing that training are, and continue to be, of the highest quality.

Monitoring

We need to continue the improvement process by constant monitoring. As technology advances so do the problems. The difference in complexity of, for example, course one and course three is enormous. This is proven by comparing the type and frequency of classification of each course. It is true to say that as soon as you have agreed a standard (or preferably - a guideline) so the parameters change. It is for these reasons a monitoring process can, in itself, present difficulties. However we are able to compare the number of observations per sample screens, and also indicate whether we have been successful in shifting the percentage of observations from importance (category) one to two and from two to three, to show improvement. This information is regularly communicated to other TDG members whereupon the Identification stage will restart.

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32 Achieving quality in networked interactive video

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INTRODUCTION

The undoubted growth of computer based training and interactive video in the past ten years has been almost exclusively concerned with individualised learning. By contrast, classroom based training methods during this period have increasingly used group centred and team approaches to promote more active participation. The National Computing Centre (NCC) has developed an interactive group training system (VISTRAIN) with the Scottish Police College to help train police supervisory officers in crowd control at major spectator events, such as football matches.

VISTRAIN is a multimedia, multi-user network training system using video based scenarios under the control of a facilitator. The system is designed to test decision making and communications skills in time-critical situations. A multimedia approach was chosen because of the difficulty of mounting realistic training exercises. The trainees will be able to act out their roles in a multimedia simulation. Video material shot at major football matches has been extensively used to give an authentic feel to the decisions taken.

It is believed to be the first known application of networked interactive video, within a co-ordinated group learning environment. This approach involves technology enhanced training in a group learning environment, and is expected to have a significant impact on management training methods since it will enable new levels of sophistication and realism to be incorporated into exercises to practice decision making and communication skills under pressure.

BACKGROUND

The control of crowds at major spectator events, such as football events involving around 40,000 spectators, requires a high level of decision making and communication skills. The incidence of violent disturbances at football matches in many European cities is unfortunately a common occurrence. Police forces are being faced with increasing problems in planning and policing major football matches and it is recognised that senior officers need to be trained to high standards.

Effective training in crowd control and similar situations requires the intelligent application of procedures in realistic circumstances. Football match commanders, responsible for the safety of many thousands of people, are required to make many rapid decisions and communicate clear instructions in an often "highly charged" atmosphere where noise levels are extremely high, making good communication very difficult.

Little formal training in crowd control has previously existed because of the difficulty of mounting realistic practical exercises which would simulate conditions experienced at a real football match.

One approach that has been tried is paper based exercises where teams of officers are given notes describing a situation and asked how they would respond. These exercises have been observed by the authors. They lack realism and do not put sufficient pressure on the participants to prepare them for actual and often dangerous events.

THE PROJECT

The Scottish Police College, in seeking a means of developing decision making and communication skills which, in addition to testing these skills, would also simulate the atmosphere and conditions experienced at a football match consulted the National Computing Centre (NCC). The consultation with NCC resulted in the joint submission of a competitive bid for funding to the UK Government's Employment Department, which was successfully accepted as part of the Technology in Learning programme. An award in the region of £100,000 was made, and the project to plan and develop the exercise commenced on 1 December 1989.

The Scottish Police College is the central police training establishment, serving all eight police forces in Scotland, representing some 14,500 officers, and all levels of training are provided. The college has considerable experience in the use of computer based training and interactive video, particularly when this is applied to learning in groups.

The Scottish Police College role in the project has been to provide the subject matter expertise and the supply and production of video material. The college has also conducted formal evaluation trials of the system as it is used as part of senior training courses at the college.

The National Computing Centre is a membership organisation run on a commercial basis. Profits from products and services are invested in the future of effective information technology for users. NCC Training has developed innovative CBT and interactive video courseware for over seven years.

NCC Training has provided the project management, instructional design, software development and integration of the system. The two organisations have worked closely together sharing expertise.

THE SYSTEM IN USE

The system is used in a specially prepared exercise which forms part of senior police training courses. Sixteen senior officers participate. The officers attend a briefing at which the layout of the stadium and match details are given. They are split into four groups of four officers taking one of four senior police officer roles: match commander; officer in-charge inside the ground; officer in-charge outside the ground; divisional control.

On the screens of their team workstations they see video scenes that relate to their role. They have only a partial view of the situation, eg the group taking on the role of officer in-charge inside the ground can only see views inside the ground and cannot see what is happening outside the ground. The network is used to synchronise the video scenes.

The teams are required to respond to various "cues", ie potentially serious incidents to which they should respond. These incidents include moving video, radio and telephone messages. The teams are required to discuss the actions they should take in response to these incidents and relay these decisions via a personal radio to the appropriate teams, whose "view" changes accordingly. Other teams in turn must respond to the messages that are received and decide upon their actions and so on.

A member of the college staff acts as facilitator to keep overall control and provide advice. The facilitator is able to monitor the teams' progress by listening in on the personal radio channels. He or she can also observe what the teams are viewing on their video display on a bank of four duplicate monitors.

The facilitator is required to assess the teams' performance during the exercise. The facilitator is provided with an on-screen storyboard indicating the appropriate actions

that each team should take in response to the events. By the use of a mouse and especially designed pull down windows, the facilitator is able to quickly record the actions taken by the teams.

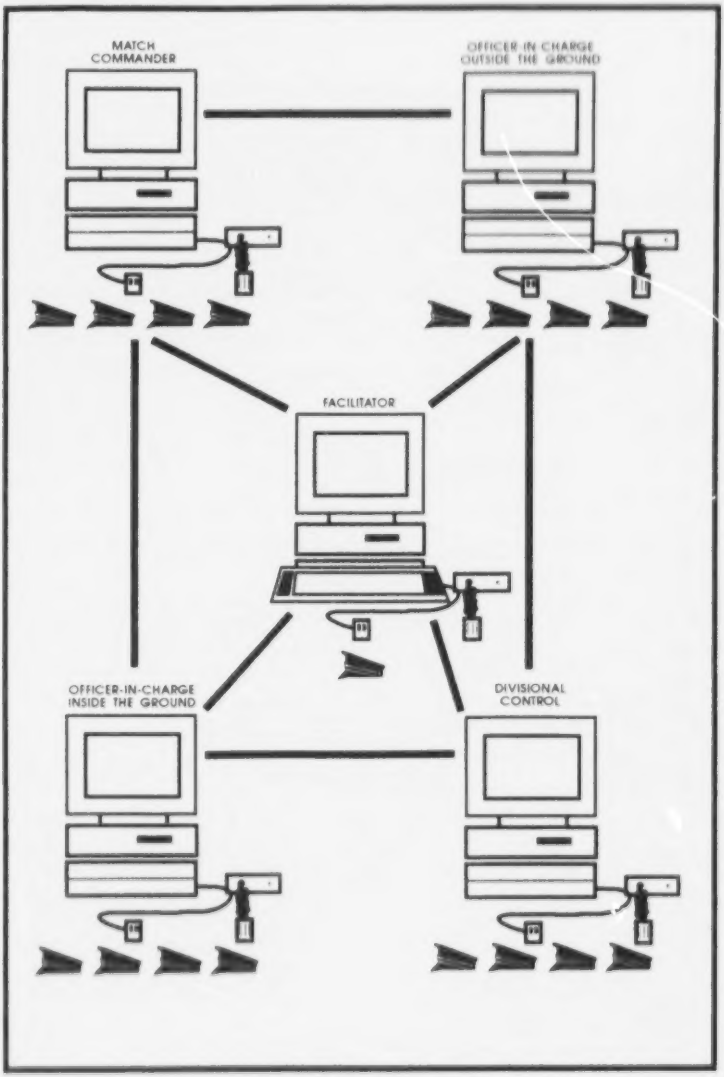

Figure 32.1 *The network*

Technology is also employed to assist the participating teams. The teams' workstations make use of a WIMP environment to offer support to the teams. Using a mouse the team

can select context sensitive help. There is also a browse facility so that the team can recall text and pictorial information from the briefing to assist them in their decision making.

The exercise is divided into four scenarios, before kick off, first half of the match, second half and dispersal after the match. There are some eight or nine events in each scenario which can be selected by the facilitator from the workstation. Examples of these events include the selling of forged tickets, illegal entry and the explosion of a tear gas canister.

After the first scenario has been played a debrief session is held. The system assists the facilitator to select those events where wrong decisions have been taken or have been communicated incorrectly.

During the debrief session, which involves all sixteen officers, the selected events are constructed by combining the video cues together with the teams' radio messages. These have been digitally recorded onto a personal computer incorporated into the system. During the debrief participants are able to review the actions taken and identify alternative actions and their likely result.

The remaining scenarios are played in a similar way, but the teams change roles. Thus by the end of the exercise they have had the opportunity to experience all four roles.

A formal evaluation of the system was carried out over a 9 month period at the College. The resulting report has demonstrated that the delivery of a high quality learning experience has been achieved. Those who have had previous experience of policing football matches have indicated that the degree of realism achieved was outstanding. Those without such experience have developed a real insight into the many pressures and problems facing a match commander and feel much better equipped to cope with such a responsibility. All indicated that there was no comparison between this exercise and a "paper feed" exercise and all found the technology easy to use.

EQUIPMENT USED

The system that has been developed for the project is called VISTRAIN (Video-based Integrated System for Training Applications). VISTRAIN is a multimedia, multi-user network training system using video based scenarios under the control of a facilitator. An essential feature of VISTRAIN is that it allows users to participate in training exercises where each has only a partial view of the total situation upon which decisions must be taken.

The VISTRAIN system has three main components:

- a network of interactive video workstations linked to a facilitator workstation
- a two channel dedicated intercom network
- a software "shell" which, in addition to synchronising the video displayed, enables the facilitator to control the triggering of various training incidents; mark and record the performance of the participants; and reconstruct the events and the participants responses during the debrief session.

The equipment used for the system comprises four Commodore Amiga 2000 computers, fitted with Commodore genlocks and attached to Sony 3300 laservision videodisk players. The facilitator's workstation is based on an Amiga 3000. These workstations are linked in a star network using ASAP's Amiox network boards. A PC compatible Commodore Bridgeboard computer is fitted to one of the Amiga 2000 computers to digitally record the personal radio messages and replay these at the debrief.

QUALITY APPROACH IN THE DESIGN OF THE SYSTEM

The design of the system followed NCC Training's standard methodology to ensure high quality was achieved in the design of technology based training courseware:

- agree training objectives
- determine training "events"
- produce an outline design
- identify suitable video and textual material
- conduct a technical feasibility study
- produce a functional specification of the system.

TRAINING OBJECTIVES

An early meeting was held at the Scottish Police College to formulate training objectives. The meeting was attended by a number of college staff, including the Commandant and Deputy Commandant. Two senior Scottish police officers responsible for crowd control at major football matches also contributed. South Yorkshire Police were represented by an officer with considerable experience of crowd control.

Some thirty detailed objectives were identified. They related to three major objectives - that during the exercise participants will demonstrate the ability to:

- communicate adequately and properly with all parties involved
- take appropriate action within areas of responsibility
- apply appropriately their knowledge of relevant legislation and regulations.

The more detailed enabling objectives were further refined and incorporated in the outline design documentation.

TRAINING EVENTS

During the discussion of the training objectives a number of typical incidents were identified which would provide suitable training opportunities. The incidents were collated to form a series of training events. It was decided to categorise these into four main scenarios:

- pre-match
- first half of the match
- second half
- post match.

The initial plan was to allow fifteen minutes for the playing of each scenario. This was found insufficient given the need for the large number of interactions between the participating teams.

The general background was established against which these events would take place, eg an all-ticket football match, capacity crowd, known history of animosity between supporters etc.

An important decision taken at this stage was that the ground would be fictitious composed of elements of actual grounds. It was felt to base the scenarios on a specific ground would risk alienating officers from other forces who may not feel the training events were relevant to their own situation.

OUTLINE DESIGN

The training objectives and training events were incorporated in an outline design document. This document also included the agreed target audiences, a primary audience of police officers, and secondary audience drawn from the other emergency services and staff from the football clubs and authorities. The roles of the participants were identified. To accommodate the sixteen attendees of a typical course, it was decided to allocate four officers to each of four roles:

- the match commander, the officer in overall command in the control room
- the officer in charge inside the stadium
- the officer in charge outside the ground
- divisional control (responsible for officers beyond the immediate vicinity of the ground).

Each team was to be shown video sequences and receive radio messages. The teams were given a limited time in which to discuss a situation and determine the best course of action. Teams were allowed to have the ability to call up information presented at the briefing for the match and pictorial information including street maps and layout of the stadium. Context sensitive help facilities would also be available to assist the teams in their decision making.

The role of the facilitator was also defined. The facilitator would control the exercise by triggering the training events and could monitor the exercise by listening in to the radio messages sent by the teams and keep track of the resources deployed.

The facilitator needed to log the actions taken and mark the performance of the teams. The main categories identified were:

- correct action taken and decision clearly communicated
- correct action taken but inadequately communicated
- incorrect action taken
- no action taken where action was required.

FUNCTIONAL SPECIFICATION

A functional specification was prepared, based on the outline design document and consideration of how the system would operate. The specification covered the following aspects:

- video source
- team workstations
- central facilitator's workstation
- verbal communication
- data networks
- video and audio distribution
- help facilities.

This document was to form the basis for an investigation of the technical options and therefore focused on the essential aspects of the system.

The functions of the team workstations were described and it was decided that the remaining decision time would be displayed to add pressure on the decision making.

Alternative ways for the teams to communicate were considered. Typing was regarded as an unnatural way for formulating verbal commands and the participants could not be assumed to have keyboard skills. A displayed menu of possible actions would limit the number of options available to the teams. It was therefore decided to simulate a personal radio system. NCC investigated the use of a proprietary intercom system which utilised the 240 volt main as the carrier signal. However this could not simulate a two channel radio network.

The various tasks required of the workstation to support the facilitator were identified for both the playing of scenarios and in the debrief. It was decided that a time log would be used for recording the radio messages so that they could be played back in sequence with the video sequences interspersed.

The initial design was based on a storyboard showing the preferred actions by each team in response to a particular event. The project team was fortunate to receive excellent co-operation from two experienced officers responsible for policing major crowd control events. The first scenario was developed as a prototype in which various conventions were developed. These included:

- an event number and time;
- the cues that would trigger decisions;
- the actual text of pre-recorded personal radio messages or descriptions of video cue;
- the expected actions of the four teams.

A significant decision was to determine the "model answers" rather than all possible options as this was likely to be confusing to the facilitator. A specially designed storyboard was devised to show the interactions of the four teams.

MANAGEMENT TRAINING APPLICATIONS

VISTRAIN addresses a training requirement common to all police forces. It has already attracted attention from police forces throughout the UK, Europe and the USA. The system has now been successfully used on twelve courses and has won three awards including the European Technology Training Award.

Although designed to help train police officers in crowd control at major spectator events, the approach used to produce VISTRAIN has significant potential applications to other areas. VISTRAIN is a unique software framework onto which any scenario could be scripted.

The approach is applicable where training is required in decision making and communications commonly required in management training. In particular, where one or more of the following training factors apply:

- situations where decision makers have only a partial view of the total situation;
- role playing is required;
- training takes place in groups;
- facilitation is preferred to instruction;
- communication skills need to be practiced;
- training needs to have a high level of realism.

The significance of the VISTRAIN approach is that it takes the sophisticated technology of multimedia from being training for the individual to being applied to the equally important development in participative teamwork training.

Section 6: Quality in Technology

This final section is concerned with quality as it impinges on the technology that we use in education. We begin with **David Hawkridge's** fundamental and controversial appraisal of the state and place of educational technology as we approach the end of the twentieth century - are we still locked into the behaviourism that originated much earlier in this century? How can we assure "Quality in modernising educational technology"?

Perhaps some evidence for development (or lack of it) might be found by a careful inspection of the study of current trends undertaken and reported by **Donald Ely** in "Trends and issues in educational technology".

In "Training quality and new technology", **Antonio Bartolomé** describes current initiatives being taken in Spain to discover the levels of utilisation of media in the classroom and the training initiatives being implemented to improve the quality of use. An application of CAI methods and technology to the laboratory teaching of electronics in Japan is addressed by **Yoshikazu Araki** in his consideration of "Connecting lectures and laboratory learning with CAI".

With "Graphical routes to quality courseware" we move into the realms of multimedia and hypermedia, where **Charles Lamont and Philip Barker** illustrate techniques that can help us to produce quality courseware for CBT applications both more efficiently and more effectively. Finally, in "Enhancing the quality of student-centred mathematics", **David Bowers and Rod Burrell** look at applications specifically in the area of mathematics workshops and describe their use of software to set up meaningful dialogue between computer and student.

33 Quality in modernising educational technology

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INTRODUCTION

Educational technology purports to be modern, even futuristic, yet uses 1960s psychological theory as its basis. Is the perceived quality of educational technologists' performance and products being adversely affected by this cracked and obsolete foundation? How can educational technology courses be successfully modernised in the 1990s? Can we borrow from cognitive science? Are we integrating information technology? Can we rise to the political and moral challenges?

My thesis is that it is time to modernise educational technology. This is not an easy task. I shall first examine the 1960s theory, drawn mainly from behavioural psychology, now discredited, and the thinking of the audio-visual movement. Familiar tools such as behavioural objectives are blunt, but continue to be used. Many UK educational technology courses, usually at the postgraduate level, follow the example of similar courses in the US by teaching behavioural psychology and the systems approach. I shall speculate on the extent to which we can borrow ideas from cognitive science instead, bearing in mind problems being experienced in that discipline. I shall look at how well we are integrating information technology into our theory. Finally, I shall identify political and moral challenges being flung at educational technologists in general.

A CRACKED AND OBSOLETE FOUNDATION

The term "educational technology" came into general use in the late 1960s, after the heyday of programmed learning. Ely (1968) had two definitions: technology (hardware) use in education, and the application of behavioural science to education. If we include the period in which programmed learning was being developed, it seems as though the dominant paradigm has been the same for about forty years. To put it another way, it is now a cracked and obsolete foundation.

It is time to modernise educational technology. This is not an easy task. We probably all agree with Gagné (1987) that educational technology involves the systematic application of knowledge derived from scientific research. It is a fact, however, that the majority of educational technologists have clung to behavioural psychology and continue to advocate the use of familiar tools such as behavioural objectives. Many UK educational technology courses teach behavioural psychology and the systems approach. The same psychology underlies much of the thinking about performance-based models of education and the definition of competencies. Behind the jargon of this conference are hidden assumptions about the nature of learning and what constitutes success. My own opinion is that we are in danger of saying to the world of education "never mind the quality of educational technology, just feel the width".

Consider the books for 1980s courses about educational technology in British universities, polytechnics and colleges. Romiszowski (1981) built entirely on ideas of the 1970s, derived from North American behaviourism and the systems approach. As Eraut (1989) commented, these ideas do not constitute established knowledge, though they may be useful to us, nor do they take account of constructivist views of learning. Percival and Ellington (1984, revised in 1988) took a similar line, presenting a handbook long on

techniques, short on theory. Rowntree (1974, revised in 1982), widely used in teacher education, was anything but theoretical perhaps because he preferred to appeal to readers' commonsense, not their knowledge of philosophy or psychology. Spencer's (1988) book on the psychological roots of educational technology depended greatly on behaviourism. He showed how Thorndike and Pavlov laid the foundations for a science of learning, but gave Watson and Skinner, both eminent behavioural psychologists, most of the credit. He also drew particularly on Bloom, Briggs, Gagné, Keller, Mager, Popham and Tyler, all Americans in the behaviourist mould, and he was right to do so, even if it underlined how much British educational technology had been influenced by them. Spencer did go further than this to consider the work of Piaget, Bruner and Vygotsky, all of them interested in how children internalise what they learn as cognitive structures or models. Finally, he referred to Papert and Salomon's research, which may yet link educational technology to cognitive science.

A couple of years ago, Romiszowski (1990) summarised the position. The educational technology movement had been criticised, he said, for insisting on too specific, product-based, uniform objectives; for placing too much emphasis on prior design and development of materials, followed by dissemination of the standard messages to all learners indiscriminately; for emphasising behaviours mastered rather than ideas processed and correction of errors rather than reflection on the implications of viewpoints; and for being shallow and superficial rather than encouraging the processing of complex multi-faceted content.

Our neglect of cognitive science may be due to its rhetorical flavour. Behaviourists stick closely to the analysis of behaviour, and do their best, even in the case of humans, to develop their discipline along strictly scientific, positivist lines. Cognitive scientists have much less empirical data available on which to base their theories. Like certain nineteenth century psychologists, they are attempting to analyse what happens inside human beings' brains, not outside. They derive their ideas from linguistics, artificial intelligence and psychology, but as yet cognitive scientists can tell educational technologists very little about how to guide learning according to the principles of their science.

The search is on for a science of learning, a set of normative rules that, if followed, will lead to successful teaching. After four decades of effort by cognitive scientists, however, it is clear that these ideas have been slow to reach children and their teachers, even with the advent of microcomputers. There is a large gap between the research laboratories and classrooms. For example artificial intelligence specialists admit that some of their work has been misguided, and that they have explored blind alleys. Their field data are hard to interpret for practical purposes.

Intelligent tutoring systems, which act like a good tutor, represent the extreme example of cognitive science applied to education. Analysis of possible errors lies at the heart of the development of intelligent tutoring systems, yet, as the behaviourists found, human learning is extraordinarily complex and predictions are very difficult. Tom (1984) does suggest that even if there are no breakthroughs, cognitive scientists may have an impact on teaching by encouraging teachers to regard their pupils more as thinkers and less as behavers.

INTEGRATING INFORMATION TECHNOLOGY

It is clear from many of the papers at this conference that educational technologists are making great use of information technology. That is not surprising. As technophiles rather than technophobes, we welcome the technology. In doing so, we are continuing

the line of thought we inherited from the audio visual movement that started in the 1920s. The challenge to us, however, is how will the field of educational technology be changed, to incorporate information technology where desirable, and to exploit its special characteristics for the sake of education? At the moment, we are assailed by technology-led solutions to educational problems. That is not what educational technologists stand for: we believe in student-led solutions in which information technology plays an appropriate role. It is a pity that in the United States and to some extent in this country too, the introduction of information technology into education has simply enabled educational technologists to apply the "failed" behavioural psychology all over again. Perhaps this was inevitable, because many technological innovations are used at first to do faster what was done before, rather than to change the nature of what is done. I need only mention the drill-and-practice programs that flooded the US education market in the late 1980s and you will see what I mean.

Of course, British schools are now using computers for many other purposes besides drill-and-practice. Some educational technologists now advocate the use of Logo, which is based on constructivist psychology. Many others expect children to learn how to use databases, word processing programs and spreadsheets, if not graphics and other software. In doing so, however, these latter educational technologists appear to be atheoretical, advocating practical courses of action without theoretical justification. We should also consider at least a few of the critics of information technology's ideology in education. For example, Chandler (1989, 1990) argued that computers project an ideology that conflicts with the purposes of the educators who put them into schools. The nature of information technology is such that we cannot avoid its influence on teaching and learning. He gave three examples: data-handling, simulation and word-processing. Let me take the first of these, in particular.

Data-bases are introduced into schools to teach children data-handling: how to record, sort, search for and display data. As Chandler said, these students learn "information-processing", using information technology, despite the fact that computers only contain data, not information. Data are changed into information by humans, not by computers. Computers deny the human origin of information. Humans negotiate meanings through discourse. Chandler said this is not merely a semantic argument: the language of computers threatens to redefine the world in its own terms.

Chandler also pointed out that because humans give the computer power and authority, data stored elsewhere appear to lose some of their significance. Data-handling systems also distort information, diminishing the value of things they cannot record, including much everyday knowledge. Creators of databases have to be willing to tailor their intentions. Searchers have to limit the questions they ask.

Chandler was worried that using computerised databases may lead students to believe that thinking is data processing. He asserted that thought and memory require building and rebuilding of models of the world, not through passive data capture but through "interpretation and elaboration of information according to changing hypotheses ... We create ideas: computers can't". Databases disregard meaning.

Computers promote the notion of their own objectivity, said Chandler. Their users often ascribe more authority to databases than to the printed word. Because databases contain standardised data, without details of sources, they seem misleadingly objective: each item carries equal weight, equal certainty. The creators' biases are invisible, the items are stripped of their origins and context. Data-processing requires fragmentation of the whole, with loss of meaning, declared Chandler. It prohibits a holistic perspective.

Saettler (1990) suggested that there was a hidden agenda in incorporating information technology into education. He said that improved managerial efficiency was the goal: more students taught in less time by fewer teachers using less space and at lower cost.

This agenda is no longer hidden. Politicians and educators in the UK and US, if nowhere else, have turned to information technology as a potential means of increased efficiency, despite the fact that the evidence from studies of costs is not reassuring. The technology seems always to be an add-on cost. So educational technologists must ask themselves whether they are bringing information technology into their work in response to such an agenda, or because the information technology actually serves the theory they hold.

POLITICAL AND MORAL CHALLENGES

If educational technology is to be truly modern, its practitioners must also respond to political and moral challenges, which happen to come mainly from the Left.

The Frankfurt School of critical theory was formed in 1923. Its founders, including Marcuse, developed studies of authoritarianism. In the 1930s they began a critique of new mass media, particularly radio, and of how they were being used by the fascists. After World War II, they mounted a critique of mass culture, which they saw as affirming the rule, or hegemony, of bourgeois values because it offered escapism and gratification, not insight. Habermas and others who came after Marcuse used critical theory to attack capitalism more directly. In particular, some critical theorists argued that capitalism was a system in which objects and the processes that produced them were valued by marketplace exchange, that is, they were turned into commodities or commodified. The commodification of the whole of society was proceeding apace, said these critics, recalling that the function of marketed objects was to profit the capitalist.

But what does critical theory have to do with educational technology? Burrell and Morgan (1979) state that proponents of critical theory "seek to reveal society for what it is, to unmask its essence and mode of operation and to lay the foundations for human emancipation through deep-seated social change" (p 284). Translated for us, this might read "seek to reveal educational technology for what it is, to unmask its essence and mode of operation and lay the foundation for learners' emancipation through rooting it out". Harris (1987) thinks of educational technology as a species of positivism, and says that all the major authors in the field of critical theory consider positivism to be a particularly acute and modern form of domination. Bowers (1988) asserted that educational technology, far from being neutral, is a powerful force that will alienate individuals, destroy community values and, through promoting a falsely objective view of the world, serve right-wing political and economic forces.

Left-wing critics like these find intellectual support in the work of Lyotard (1984), whose message about the "post-modern condition of knowledge", in present day western industrialised society, is that capitalists are turning knowledge into a commodity, to be bought and sold in a marketplace which they dominate. Fox (1989), who aims at open and distance learning, rather than directly at educational technology, sees these as a branch of the "knowledge industry". He suggested that "knowledge and the opportunity to learn are benefits to be bought by private individuals rather than fundamental rights belonging to every member of a democracy" (p 270). In the circumstances, open and distance learning become a "dream instrument" for the control of the ruled. This may be a surprise to those of you like me who are engaged in designing this learning. Burt (1991) suggested that "educational technologists cannot escape the epistemological crisis which confronts all the other social disciplines. The new critical theory aims to address the crisis by making previously suppressed voices heard" (p 229). Burt saw the educational and training technology literature as tending to express the ideologies of technological optimism and national economic competition, close to the dominant ideology of British and US society.

This sort of criticism is hard to take for educational technologists who feel that they have frequently participated in benevolent, well-intended educational reform. They are forced to admit that educational technology can be used for the wrong ends, but not that educational technology is always used thus. Even in general it does not have such a malign influence, we hear them say. Critical theorists do not deny the good intentions of educational technologists: they simply say that the results of such endeavours enhance the promotion of "falsehood and negative value".

The best defence against the critical theorists is to point out that they propose substituting their own hegemony for the capitalist one, and that educational technologists desire to be slaves to neither. Critical theorists are essentially nihilistic: they offer no constructive ideas to those they accuse. Nevertheless, modern educational technologists would do well to develop their own political consciousness, just as they should modernise their theoretical foundations, and examine why they are integrating information technology.

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34 Trends and issues in educational technology

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INTRODUCTION

There are many ways in which trends could be identified: expert opinion, panels of specialists, or informed observation. This study chose content analysis as the primary vehicle for determining trends based on earlier work of Naisbitt (1982) and his model (Janowitz 1976). The basic premise of these works is that current trends can best be determined by what people are saying publicly, through newspapers and magazines. This study, and those that preceded it, used the same basic procedure: identification of emerging topics in key publications over a period of one year. The literature of the field has been chosen as the best comprehensive coverage of current thinking and events in the field. A selected body of literature has been reviewed using a team of educational technology specialists.

LITERATURE SOURCES

To maintain consistency from year to year, the same sources of information were used as in two earlier studies, Ely (1989, 1990), with a few exceptions. To aid in the selection of sources, the Moore and Braden (1988) report was used. This source reported the people, publications, and institutions of "high Prestige" that were identified by a survey of personnel in the field. The highest ranking journals and the dissertations produced by American universities that ranked highest served as two major sources of literature.

Additional sources of data were the papers given at major national and international conferences and the input to the ERIC database in the field of educational technology. The ERIC system solicits unpublished materials such as reports, evaluations, studies and papers for review and, following evaluative criteria, selects the best for inclusion in the database. The Clearinghouse on Information Resources is responsible for the field of educational technology and therefore documents selected from that source are likely to represent current developments in the field.

The complete set of sources used was:

Journals (October 1990 - September 1991)
British Journal of Educational Technology (United Kingdom)
Education and Training Technology International (United Kingdom)
Educational Technology
Educational Technology Research and Development
TechTrends

Dissertation Sources (1991)
Arizona State University
Florida State University
Indiana University
Syracuse University
University of Southern California

Conferences (1991)
Association for Educational Communications and Technology
Educational Technology International Conference (United Kingdom)
National Society for Performance and Instruction

ERIC Input (October 1990 - September 1991)

From the reviews of four coders, discussing more than 1300 items, came a list of "topics" that were most frequently presented in the literature. The recording units offer a first indicator of trends. Further analysis of each category and subcategory reveals sharper distinctions. At this point the key literature is added to the mix. Key literature consists of policy papers, reports and statistical data for each topic area that was published during the time period of the study. This information, together with the content analysis, was studied by the author who then drafted the trends and sent them to external reviewers. Changes were made based on their comments.

CONTEXT

This study answers the question, "Where is educational technology headed?" Technology does not move alone apart from the society in which it exists. Information and communication technology is being used in the home and workplace at all levels - local, state, regional, national,and international. To separate it from the context is to highlight its products rather that its uses and impact. Therefore, much of the discussion in this study involves the total fabric of technology in society rather than technology as an entity in itself.

TRENDS

Using a content analysis of the 1991 educational technology literature, the following trends have emerged:

1. The creation of technology-based teaching/learning products is based largely upon instructional design and development principles.

There appears to be more evidence that materials developed for the purpose of teaching and learning use design principles that have their roots in cognitive psychology and instructional science. More than 15% of the items reviewed for this year's study were devoted to design and development. Major subheadings included message design, product development and course development.

2. Evaluation has taken on greater importance as the concept of performance technology has been further developed.

More than 10% of the 1991 literature was concerned with some aspect of evaluation: process evaluation, product evaluation, cost/effectiveness assessments and formative evaluation.

3. The number of educational technology case studies is growing and provides general guidance for potential users.

More than 11% of the literature reported on specific use of media and technology in teaching/learning settings. Almost all the case studies were "successful" and many could serve as models for potential users. Very few reported "failure" or negative outcomes. About one-half of all the case studies related to computer use in teaching and learning. There were almost no cases of traditional media use or instructional procedures that have been "proven" in the past.

4. Distance education is evident at almost every educational level in almost every sector.

Distance education has become a major instructional force in education. A recent estimate is that 25%-50% of U.S. students are reached by distance learning technology

(School Technology News, 1991). There is probably no other single trend that encompasses the theory and practice of educational technology better than distance education. Its frequency in the literature confirms this observation.

5. The field of educational technology has more and better information about itself than ever before.

Eighty surveys about various aspects of the field were reported during the time frame of this study. For example, studies of the most frequently published textbook authors, a list of current dissertations, the extent of microcomputer penetration in the schools and other such reports help to paint a quantitative picture of the profession.

6. Computers are pervasive in the schools. Virtually every school in the U.S. has microcomputers.

Computer applications permeated the literature of educational technology in 1991. Purposely omitted from the analysis of trends were 14 journals associated with computer assisted instruction (CAI) and conferences that focused on the computer as an instructional medium. Sometimes the items were directly focused on the use of computers in the classroom for direct subject-matter instruction but most referred to learning about the computer as a tool. Many items discussed the resistance or "roadblocks" to the use of computers in schools.

7. Telecommunications is the link that is connecting education to the world.

Telecommunications is an overarching term that describes electronic point-to-point connections between individuals and groups. Translated into electronic delivery terms, telecommunications technology includes connections that utilize existing telephone lines, dedicated lines, cable and satellite transmission. Some messages are intended to be interactive, such as electronic mail (e-mail), computer conferences and two-way audio and video conferences. Some are intended to be one-way, e.g., television directed to classrooms through cable and satellite systems. The dominant trend within telecommunications is networking - the electronic connection of individuals who have common interests.

8. The teacher's role in the teaching and learning process is changing as new technologies are introduced into the classroom.

Positive attitudes toward technology are emerging from teachers' unions and from teachers themselves. Introduction of such new approaches as Integrated Learning Systems (ILS) bring about new roles for the teacher.

9. There is increasing pressure for the schools to consider the adoption of technology while, at the same time, concern is expressed for the impact of technology on children in society at large.

This trend is a two-edged sword. Pleas for the use of technology in the schools are increasing in frequency. Simultaneously, there are cries of concern over the impact of technology, especially television, on children and youth.

10. Professional education of educational technologists has stabilized in size and scope.

There may not be much uniformity in the titles of academic programs that prepare individuals to serve in the field of educational technology and the academic "homes" are not consistent from university to university but, in general, the field is holding its own. Programs tend to include similar content, are primarily offered at the graduate level and prepare people for similar positions.

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35 Training quality and new technology

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INTRODUCTION

The aim here is to describe an interactive course that attempts to improve the competence of teachers in the use of videos and computers and to discuss the outcomes. The material is being used in research concerning interactivity levels, path control, communication channel and cognitive styles. The paper includes results from research work undertaken in Catalonia, and the design of the interactive video course.

Nine years ago, Chadwick (1983) announced the "Law of Hammer": if you give a small child a hammer, he will immediately conclude that all around needs a good hammering. In the educational field, give a trainer a new resource and he will immediately conclude that ...

Perhaps it is the "Law of Hammer" that turns trainers upside down in computer assisted instruction (CAI), as they take the big leap to artificial intelligence, flying over hypertexts on their way towards new authoring languages. In my opinion, it is at this moment that they should emerge into the street from the multimedia sewer in order to get a glimpse of the unreal virtual reality world. Today we find ourselves in such fields as these, with more projects than realities.

At Barcelona University, the Department of Curriculum and School Management has been training the teachers of the future in the use of educational technology for years, both with undergraduate and postgraduate courses. Several methodological tools have been developed for these courses. Among them, we have the "New Technology for Teaching", hypermedia with interactive videodisc support.

NEEDS ANALYSIS

From 1987 to 1992 several different studies were carried out in Catalonia about the use of technological resources in schools. In fact, this line of study has been followed by the introduction of the New Technology Work Group (GTNT). The research was financed by the Service for Popular Culture Foundation. This study investigated the way in which teachers used video in their teaching practice and was based on fieldwork that was done by 6 observers in 50 schools chosen as a good cross-section of all the different schools in Catalonia (Bartolomé and Ferrés, 1992).

Amongst the general conclusions were: video equipment was a resource that teachers handled a lot, but to which students had much less access (see figure 35.1). Even where pupils had access to video equipment, this was largely as viewers - 92.3% had viewed video, whereas only 18.5% had used a camera, out of a total of 4000 pupils.

Here we must point out that, in relation to computing, the situation is different: the utilisation has a much smaller base, but the relative involvement of the students is much higher.

And so, what is video used for? Out of 15 possible Video uses, the most accepted was "to transmit information to the classroom group". So we should not be very surprised when we realize that 78.8% of the 150 teachers who were asked had never even considered the video as a resource for consulting or studying on an individual basis.

Thus, pupils get little access to the sets of equipment nor can they use the playing or recordings systems, nor can they get to a viewing system in order to do individualized

or group work.

We obtained other conclusions from this work and these have provided the basis for the design of the course "New Technology for Teaching".

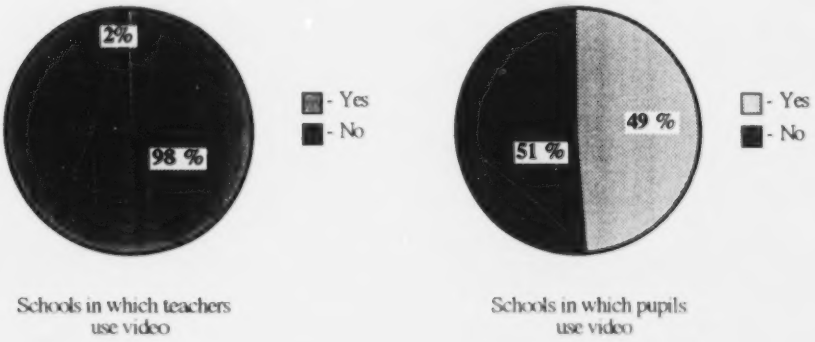

Figure 35.1 *School utilisation of video*

CONCLUSIONS ABOUT VIDEO USE

We can conclude from the research that the teaching method is not modified by the simple introduction of video technology in the teaching-learning process. Really, it is the complete opposite. There is a tendency to "domesticate" the media, forcing it to act as a second teacher.

But this study suggests that there is room for more innovative uses, both creative and participative, where teachers actually integrate the technology in this way.

Generally speaking, we cannot say that teachers have reached the stage at which the video has been completely integrated in the classroom. Most pupils see video as an isolated experience, and they do not look upon it as an integral part of every day school activities.

Despite the relatively small amount of time for which the video is used in schools, pupils value its incorporation in a very positive way, as an aid to learning. In this sense, it is a pity that it is not used in a better way, both from a quantitative and a qualitative point of view.

In general, the study shows that it is the most passive and the most one-way video uses that are incorporated in schools: the video player is used more often than the camera, and it is handled more by the teacher, than by the pupils; programme-viewing is more typical than other activities; more video lessons are watched than motivating programmes.

This tendency towards a passive use of video can be explained by three factors: firstly the lack of teacher-training about more imaginative and participative uses, secondly the lack of an adequate technological infrastructure in schools, and thirdly because there is no time available for creating new types of use.

A further factor that must also be taken into account is that the manufacturers of educational video-programmes practically always produce the same video-programme model, without offering any other alternatives.

Among the positive values, we ought to point out the fact that the use of the video workshop is on the increase in schools. Despite the lack of means for this activity and the fact that it only can be used by a small number of pupils, this is a very creative and participative formula.

This study has shown that there is a significant deficiency in schools regarding audiovisual literacy and critical reading of media. Very few schools offer education in this field, and this means there is a very big separation between school and society in use of media.

Incorporating video in teaching practice does require an extra effort from the teacher, and therefore only those teachers who are particularly interested, or who are very enthusiastic, are likely to put this means into practice.

A PROJECT TO IMPROVE TEACHING QUALITY

From this and other research, some action plans were drawn up. One of these was to develop material about new technology use that laid emphases on the methodological aspects of this use. The final products can be defined as follows:

- An optical videodisc entitled "New Technology for Education" incorporating motion pictures and still images about the introduction of video and computers in both primary and secondary education.
- A control software that allows access to the different sequences, helps the user to get to specific information, gives access to a dictionary of technical terms, and that also includes written textual information about certain aspects of the subject.
- Some versions include individualized and group learning programmes.

Three aspects were taken into account in the course design:

- The technical aspects of equipment
- The communicative aspects of the media: media language
- The educational aspects relating to how to use these media: resources methodology.

COMMUNICATIVE ASPECTS

The programme has two types of sequence:

Base-sequences

Present key aspects of computing, video and telecommunications in an intuitive and general way. They do not offer detailed information, but try to give clues that will lead to further discussion, to suggestions for group-work, to encourage individualized study. They are video-sequences with moving images and sound effects, and their lengths vary between 20 and 120 seconds.

Complementary-sequences

Present certain aspects in an accurate and detailed fashion. In order to do this, they use a written text in the computer, which is illustrated and is based on still images shown

from the videodisc.

Using any of these sequences, users can access the Dictionary and other buttons are available as illustrated in figure 35.2.

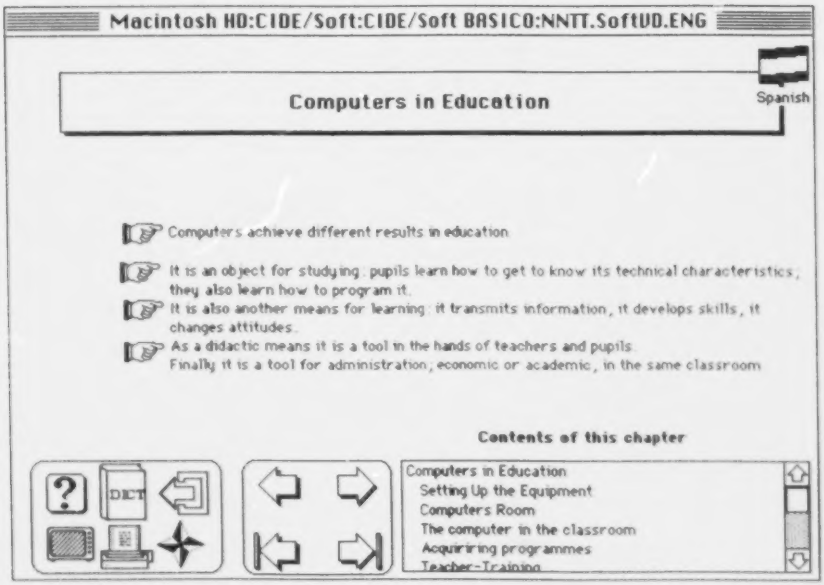
Macintosh HD:CIDE/Soft:CIDE/Soft BASICO:NNTT.SoftUD.ENG
Computers in Education
Spanish
Computers achieve different results in education
It is an object for studying: pupils learn how to get to know its technical characteristics; they also learn how to program it.
It is also another means for learning: it transmits information, it develops skills, it changes attitudes.
As a didactic means it is a tool in the hands of teachers and pupils.
Finally it is a tool for administration, economic or academic, in the same classroom
Contents of this chapter
DICT
Computers in Education
Setting Up the Equipment
Computers Room
The computer in the classroom
Acquiriring programmes
Teacher-Training

Figure 35.2 *Sample video screen display*

DIDACTIC PLANNING

This programme has been designed to meet different needs:

- As a tool to support teaching explanation in specific subjects - the teacher can offer support to his demonstration by using still images or by employing whichever video-sequences he considers appropriate.
- As a means to generate small-sized or average-sized group dynamics the - video-sequences lead to group discussion or other role-playing type activities.
- As support to group learning - the pupils use written guides in which different themes are presented. Each individual uses the programme to collect information about these themes, as well as using other resources such as books. Later, together with the teacher, the results they have achieved in their work are discussed.
- A support to individualized learning - a computer programme directs the learning by asking a series of questions in which the pupils must use the videodisc, with different levels of interactivity, to answer these questions.

SHOULD EDUCATIONAL TECHNOLOGY BE USED IN SCHOOLS?

The last aspect that we need to consider is to ask if it is really worthwhile to use these resources.

We should like to be able to say that pupils, with the help of technology "learn more, in a better way and faster ...". Unfortunately, according to Clark (1983), five decades of research have shown that there are no benefits to be gained in learning from using different teaching media. With regard to reducing the amount of necessary learning time, Clark points out that the new media hold a slight advantage over more conventional ones. Kulik et al (1980) carried out a meta-analysis between traditional courses and courses that used computer-based training, with results showing an effectiveness in favour of the latter type. This greater effectiveness was considerably reduced when the same teacher prepared and taught both the experimental and control group. In the long-term results, this effectiveness practically disappeared.

But these considerations make a basic mistake: they try to make a comparison to show what happens when we teach old material with new resources. MacLuhan was probably right when he related contents and media: new media teach new contents, they address different aims than traditional media.

The use of new technology is related in a strange manner to studies about the hidden curriculum and with the school that we present to our pupils: a shool which is separated and different from the world outside in which they live (Treffel, 1981). A school without computers teaches something to students: "this school is not related to your world, to your needs, to your future; we are not interested in your society". It does not matter that teachers do not think so: this is the content of the hidden curriculum.

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36 Connecting lectures and laboratory learning with CAI

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INTRODUCTION

As the number of college and university students rapidly increases, their educational needs, motivations, levels and abilities become more diversified. Also their attitudes towards their studies and their interests in college life are quickly becoming more varied. To make matters worse, the number of students who are unable to fully understand the lectures, and are therefore less likely to be willing to study, is gradually increasing. It may be because the students do not understand the materials being presented to them or that teachers are not making an effort to examine their students' progress. Perhaps the fault is with the teaching methods. The use of textbooks and handouts does not suffice to ensure the students' comprehension of a lecture. A professor (particularly of Engineering) cannot expect the students to easily grasp theories and schematic explanations without the use of visual aids. In Engineering, if we can explain theories with data derived not only from simulation but also from the actual device or circuit, lectures will be more persuasive and practical. Using personal computers, the author is introducing a technique to show real experimental data that verify the theories presented in the lectures.

PROBLEMS WITH LABORATORY

It has been usual in Japanese universities and colleges for the lectures and seminars to be given independently of the laboratory courses. The same teacher rarely does both. In order to provide the students with more practical knowledge, the laboratory courses are particularly important in the university curriculum for engineering.

In order to maximise effectiveness, it is highly desirable that the relationship between the lectures and relevant laboratory learning be significantly strengthened.

In an average Japanese laboratory course, a student is obliged to work with several other students because of the shortage of measuring equipment and space. Thus , some students are unable to participate in all the projects of the laboratory. Unhappily, the result is that those students tend to rely on their classmates for the material in their reports, and do not develop their own ability to research the subject thoroughly.

APPROACH TO SOLVE THE PROBLEMS

In order to solve these problems and to improve this situation, Imamura et al 1989 have suggested that teachers should make much more effort to improve their teaching techniques, by utilizing various new media. The author is developing such a new teaching system. It consists of three parts: first, the Pre-Laboratory-CAI Test (Pre-Test); second, the laboratory; and third, the Post-Laboratory-CAI Test (Post-Test). We call this system RECALL (Real Experience Computer Assisted Laboratory Learning). Figure 36.1 shows the fundamental concept of RECALL system.

The Pre-Test is done to check basic knowledge of experimental theories, equations and methods which are necessary for understanding and finishing the laboratory successfully

within a limited time. If the result of the Pre-Test is less than 70%, the student should study the subjects using tutorial type CAI. Then he should take the Pre-Test again. If the result is over 70%, he is permitted to begin the laboratory. He is permitted to take the Pre-Test three times within 45 minutes.

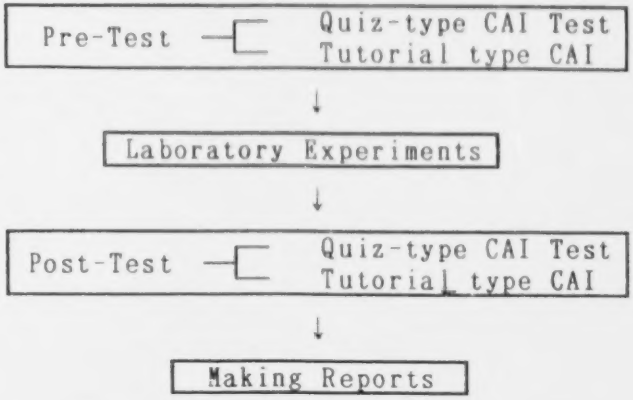

Figure 36.1 *Fundamental concept of RECALL system*

COMPUTER ASSISTED MEASUREMENTS

We have been developing a system, using a computer, to measure voltage-current characteristics of a bipolar junction transistor (BJT), a junction type field effect transistor (JFET) and a metal-oxide-semiconductor type field effect transistor (MOS FET).

The hardware configuration of the system consists of common hardware, a curve tracer unit and signal generators. The common hardware consists of a personal computer, an I/O interface card and an analogue interface unit. The personal computer is PC-9801 (NEC) with 8086 family CPU. The analogue interface unit converts external analog signals into digital data and vice versa with 12 bits A/D, D/A converters. The curve tracer unit is used literally as a curve tracer for the measurement of voltage-current characteristics of BJT and FET. The unit contains V-I converters and voltage amplifiers. The converter converts voltage supplied from the D/A converter into current (e.g. I_B of a BJT). The amplifier is used for providing voltage (e.g. V_{CE} of a BJT).

Common software consists of some controlling programs and the main program. The former control data flow between analog interface unit and personal computer for each application. The latter integrates application softwares.

Before starting the laboratory, students should know the theories behind these devices. In the laboratory, students not familiar with measurement equipment often acquire insufficient or incorrect data due to errors in operation, thus wasting time. This system reduces measurement time allowing students more time to spend on consideration of the main theme of the laboratory.

In the laboratory, input, output and mutual transfer static characteristics of the devices are measured. All measurements are done automatically by following messages displayed on the CRT of the personal computer. Table 36.1 shows an example of measuring

procedures. Measuring steps for V_{DS}-I_{DS} output static characteristics of FET are as follows;

1 Inputting student's number in order to store learning record.
2 Inputting measuring conditions such as weather, temperature and humidity.
3 Displaying the explanation of a measuring operation.
4 Inputting a name of a device.
5 Preparation for measurement.
  Setting i) output voltage V_{DS}
  ii) maximum input voltage V_{GSmax}
  iii) maximum output current I_{DSmax}
  iv) step increase in output current I_{DS}
6 Measuring V_{DS}-I_{DS} output static characteristics.
  Here V_{DS} and V_{GS} are applied from the D/A converter. Values of I_{DS} are taken into the A/D converter.
7 Outputting V_{DS}-I_{DS} output static characteristics on a CRT and in a printed form.
8 Measuring other characteristics.
  After taking the measurements students should learn the characteristics of the device by using their own data to answer questions such as the calculation of h-parameters, input resistance and output resistance. For example, from the result of Grounded Emitter output static characteristics, a student should calculate h_{FE} at a certain point on the output characteristic curve according to a message displayed on a CRT. After calculating the h_{FE} the student inputs the value and the computer checks it. These processes are repeated until the right answer is obtained. Thus students should come to understand the actual characteristics by the use of real data.

After all the processes mentioned above are finished, the Post-laboratory-CAI Test (Post-Test) is taken to check understanding of the completed section of the laboratory. If the result of the Post-Test is less than 80%, the student should study the subjects using tutorial type CAI. Then he should take the Post-Test again. If the result is over 80%, he is permitted to finish the laboratory. The time allotted for the Post-Test is limited to 45 minutes. At the end of the laboratory, students submit reports including data, problems, results of the Pre-Test and other considerations.

Measuring Flow
(1) Inputting (2) Preparation for measurement (3) Measuring (4) Outputting
Laboratory Experiment Condition
Measurement for V_{DS}-I_{DS} output static characteristics of FET ① output voltage V_{DS} ② maximum input voltage V_{GSmax} ③ maximum output current I_{DSmax} ④ step increase in output current ΔI_{DS}
Measurement for V_C-I_C output static characteristics of BJT ① output voltage V_{CE} ② maximum input voltage V_{BEmax} ③ maximum input current I_{Bmax} ④ step increase in input current ΔI_B

Table 36.1 *Measuring procedures*

CONCLUSION

The author has developed a new learning system where students measure characteristics of real semiconductor devices such as V_{DS}-I_{DS} or h parameters using personal computers, then confirm the theoretical characteristics by CAI. This system combines practical data and phenomena with theory which is taught in a regular lecture course.

Through the RECALL System (the Pre-laboratory-CAI Test, the laboratory and the Post-laboratory-CAI Test) and CMI system, students' understanding of laboratory is accurately and easily evaluated.

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37 Graphical routes to quality courseware

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INTRODUCTION

Computer-based training (CBT) is concerned with the automatic delivery of training and learning material using a computer system. In the past, screen-based text has been the main method of communication. However, it has been shown that augmenting basic textual material with appropriately designed static graphic imagery produces a communication mechanism of significant pedagogic effectiveness. The use of moving pictures (in the form of TV quality video images and animated graphics) has similar potential for improving the quality of multimedia instructional delivery within CBT systems. Further improvements in the quality of CBT courseware can be achieved through the incorporation of hypermedia techniques (Richards and Barker 1992).

Unfortunately, the development of multimedia and hypermedia courseware can be highly problematic unless suitable development tools are used. For this reason a considerable amount of research has been devoted to the development of tools to automate the production of courseware (Barker 1990; Barker and Lamont 1992). The motivation for using these tools primarily arises for four basic reasons: first, the need to decrease the number of steps and/or phases involved in the overall courseware development process; second, the need to reduce the level of expertise needed to develop effective and efficient courseware; third, the growing necessity to cut down courseware development costs; and fourth, the need to reduce the amount of time devoted to producing instructional software.

In this paper we describe an approach to courseware automation which we have found to be extremely effective. It is based upon the use of "custom editors" that are designed to augment and enhance the facilities provided by the graphical user interface to the PROPI courseware development system (ASYS Computer Services 1988). PROPI is essentially a courseware generator that produces PC/PILOT code (Barker 1987; Conlon 1984). In the remainder of this paper we provide a short description of the PROPI graphical user interface and then illustrate how custom editors (written in C) can be used to provide high-level, easy-to-use authoring facilities to ease the production of high-quality multimedia and hypermedia courseware.

GRAPHICAL USER INTERFACES

People interact with computers by means of appropriately designed human-computer interfaces (Barker, 1989). Screen-based interfaces fall into two basic categories: character orientated (based upon the use of a keyboard); and graphical user interfaces. A graphical user interface (GUI) relies upon the use of icons, images and pictures to support pointing operations based upon the use of a mouse. There is considerable evidence to support the claim that graphical user interfaces are easier to use and that they can lead to substantial increases in end-user productivity.

A number of CBT authoring systems are now supplied with graphical user interfaces which act as 'front-ends' to an existing development tool. TenCORE and PC/PILOT are two examples in which this approach is used. In many other systems (such as HyperCard, ToolBook and Authorware Professional) the GUI is the only interface that is available to courseware authors. Because of their ease of use, systems of this sort are becoming extremely popular - mainly because users need not have any technical knowledge of computers or do not need to know how to write computer programs. There

is another reason why these GUI-based authoring systems are growing in popularity: they provide a relatively easy way of developing high-quality courseware.

The ease of use of a GUI-based authoring system stems from the fact that each generic type of courseware authoring function is represented on the author's computer screen by means of a reactive icon. PROPI, for example, has seven basic classes of icon: input, output, decision, mark, question, group and external. A fundamental property of these reactive icons is that they can be selected (using a mouse) and cloned. A cloned icon can then be positioned on the CRT screen so as to form part of some more complicated graphical structure.

In order to produce a piece of instructional software, a courseware author uses the screen-based menu of icons in order to construct a "lesson map". This is simply a pictorial representation of the logic flow and functionality that is to be embedded within the courseware. The lesson map is essentially a graph structure which is very similar in appearance to a computer flow-chart. Each type of node within a lesson map has associated with it a series of content "editor" templates. These are used either to specify the pedagogic content of a node or to give control information that specifies how a node is to be delivered. Once a graphical lesson map has been produced it can be automatically converted into CBT code.

CUSTOM EDITORS

Authoring tools of the type described in the previous section provide a powerful mechanism for generating courseware provided, of course, that they are able to offer all the major functions that authors require. Invariably, due to the very nature of progress, there will always be some things that are missing. Some mechanism must therefore be provided which will allow users to "extend" an authoring environment in ways that are relevant to their own particular needs and requirements. This mechanism is provided in PROPI, for example, by means of "custom nodes" (ASYS Computer Services 1988). The purpose of custom nodes is to facilitate the automatic generation of PC/PILOT code for performing tasks which are not directly catered for by PROPI itself.

A custom node (within a PROPI lesson map) is a generic node which, when invoked, causes the activation of an external (user written) "custom editor". The purpose of a custom editor is to generate CBT code from parameters entered by the courseware author while a CBT lesson is being developed. Obviously, there is no limit to the range of custom editors that a particular PROPI authoring environment can make available to courseware authors.

The program code used to produce a custom editor can be written in any programming language (we use C for most of ours). During its execution a custom editor must generate a user-interface to facilitate the entry of the parameters that are needed in order to build the target code that is to be generated. Obviously the design of end-user interfaces to custom editors offers considerable scope for the application of GUI techniques and the provision of mechanisms that will minimise any errors that authors make with respect to the entry of code generation parameters.

In the work that we have undertaken using PROPI, a wide range of custom editors have been built for use with electronic books (Barker 1991) and for controlling various multimedia presentation devices. The following section presents a case study which describes one of the courseware automation projects in which we have made extensive use of PROPI custom editors.

A CASE STUDY - MULTIMEDIA AND HYPERMEDIA CBT

In this case study we describe some of the ways in which we have been using custom editors (within the context of courseware automation) in order to: (a) provide "user friendly" interfaces to "high technology" information display devices; (b) make available a standard and consistent graphical user-interface (GUI) to a range of different peripheral devices; and (c) improve the quality of CBT courseware through the incorporation of interactive multimedia and hypermedia techniques. The essential features of this courseware automation project are illustrated schematically in figure 37.1.

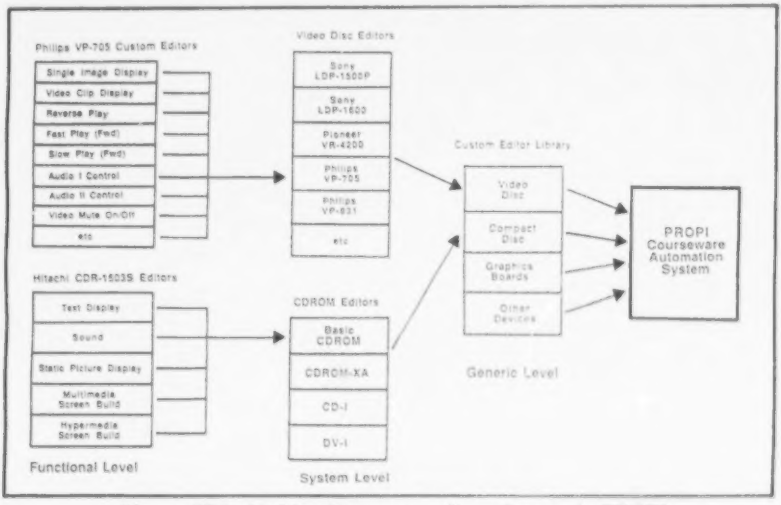

Figure 37.1 *Multimedia custom editors for use in PROPI*

In order to "insulate" courseware developers from the complexity of programming these devices the GUIs employed in our custom editors are standard ones for all devices (or technologies - such as CD-I and DVI) within a given generic class. That is, no matter which actual device is employed for information delivery, the GUI allows a consistent style of use, has a standard appearance and provides access to a standard repertoire of control options. Courseware authors can access the particular editor of their choice either by a menu selection strategy or directly by entering its name.

To date we have implemented a full set of custom editors for the various types of video disc equipment that we use. Custom editors are also available for basic compact disc equipment, selected graphics boards and one or two special devices such as a touch screen and a concept keyboard. Descriptions of the design, implementation and evaluation (from the courseware authors' point of view) of these custom editors are presented in detail elsewhere (Lamont 1991). Our current work with custom editors is now directed at extending the range of editors that we have available for use with digital optical storage technologies. Because these technologies are likely to have a significant impact on courseware development for CBT, we are now extending our range of editors to include facilities for handling digital video interactive (DVI), compact disc - interactive (CD-I) and compact disc extended architecture (CDROM-XA). Further details of this work are described in Lamont and Barker (1992). One very important aspect of this particular courseware automation project from both the courseware authors' and the

students' point of view is "image reactivity". That is, the ability to embed and use reactive areas (or hotspots) within images and text so that when one of these areas is selected (using a pointing device such as a mouse) other related processes are initiated. Image and text reactivity is an essential requirement for the creation of hypermedia structures and their subsequent incorporation into CBT courseware. To this end we have designed (and are currently in the process of implementing) a range of custom editors to facilitate: (1) the insertion of hotspots into images; and (2) the linking together of image, text and sound within a hypermedia knowledge corpus that is held on digital optical storage media (primarily, CD-ROM). We believe that these custom editors will substantially improve the productivity of our authors and the quality of the courseware that they produce.

CONCLUSION

Multimedia and hypermedia techniques are playing an increasingly important role in the development of quality courseware. However, the incorporation of these techniques into instructional software requires significant technical (and pedagogic) skills if they are to be used in an effective way. While it is difficult to automate the pedagogic aspects of authoring, the technical requirements of authors can be substantially reduced if appropriate courseware automation techniques are made available. We have found that graphical user interfaces (used in conjunction with custom editors) can play a significant role in easing the burden of courseware authoring for multimedia and hypermedia CBT.

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38 Enhancing the quality of student-centred mathematics

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INTRODUCTION

This workshop addresses how aspects of information technology can influence the quality of the learning experience and in particular how IT can promote a flexible response to individual student need. This will be related primarily to delivery within the area of mathematics.

The need to meet customer demands in delivering a quality flexible response has led Suffolk College to investigate the use of authoring software which allows a one to one relationship between the student and the lecturer through the use of such software.

The need to identify the diagnostic element of the student lecturer exchange can be satisfied by the logic built into the authoring solution. More sophisticated communication is non-linear, expressing at least a two way conversation: the use of a quality IT solution delivers this.

The aim of the workshop was to encourage participants to identify quality delivery within the mathematics area, specifically related to information technology solutions; and to allow hands-on experience of a number of examples of related software.

The objectives were:

i) to set the scene within the wider educational arena;
ii) to explain how Suffolk College has harnessed a number of organisational and technical solutions to deliver mathematics to a diverse student population;
iii) to explore the use of authoring software as a link between the flexible response and the individual student need.

SETTING THE SCENE

Suffolk College

Suffolk College is a classic example of a mixed economy institution. It plays an essential role in the delivery of Suffolk's Post-16 education and training. This includes school-linked A level and vocational provision, non-advanced further education, adult and community education, and advanced further education.

The Academic planning figures for the next three years project an increase in student numbers of 31 percent and all departments within the College are addressing ways of enhancing the quality of student provision.

Mathematics

Recent developments in the qualitative nature of mathematics provision were discussed, as well as advances in computer technology. Together, these provide motivation for investigating the opportunities for computer based learning in mathematics, and workshop participants were invited to contribute their own experiences. In particular, the following have had an impact on mathematics provision:

- Common Skills, Core Competences, and Curriculum Entitlement - this new awareness in course design requires a formal response from maths education
- Syllabus changes - these result in potential inconsistencies at course "interfaces" (eg GCSE, BTEC OND)
- Mathematics Workshops - these necessitate a re-appraisal of delivery methods (eg resource-based learning)
- Mechanical calculating devices - yesterday hand calculators, today microcomputers, tomorrow ...?

Information Technology

Hardware Developments

Hardware performance has increased dramatically whilst, at the same time, costs have fallen. This has led to the availability of hardware to perform complex processing tasks at affordable prices.

Software Developments

The release of Microsoft's Windows 3.1 together with its multi-media extensions kit, will allow the ease of use of such media as CD-Roms, still and moving video, and sound, in many application areas.

Delivery of the Curriculum

The use of Computer Based Learning has already allowed the curriculum to be delivered in non-traditional ways, the coming of improved hardware and software products will allow the curriculum to be delivered in an even greater variety of ways. The College has to be able to facilitate this delivery.

SUFFOLK COLLEGE CASE STUDY

This case study served as a basis upon which participants could relate their own work. It also provided examples for critical evaluation and as a springboard for new developments.

A recent HMI report noted that: "Almost half the colleges in England have... Mathematics Workshops, where students may study on their own or under guidance with learning materials which suit their individual needs ... a balance between structured sessions and workshops is a particularly good approach to teaching mathematics at this (FHE) level".

However, it continued: "The use of IT in mathematics teaching is still not widespread... there is scope for using the microcomputer more extensively and imaginatively in mathematics ... IT equipment must be made more accessible to students".

The facilities of the Mathematics Workshop at Suffolk College were outlined, where an open plan area contained a 24 station NOVELL pc network as well as a BBC microcomputer ECONET network.

Two examples of currently available commercially produced mathematics teaching/learning software packages were available for demonstration on BBC microcomputer.

These packages ("Revise Maths" by AVP Computing, and "Mathspad" by Longman MicroSoftware) had proved particularly successful at Suffolk College. Participants in the workshop could evaluate this software, and in doing so become aware of: examples of good practise; areas with the potential for further development.

SHARING OF PARTICIPANTS' EXPERIENCE

Group Activity 1

The participating groups were asked to share examples of good and useful software that they have used.Why did they find it so? Does it have any drawbacks or limitations?

Group Activity 2

To establish the criteria for good software packages to aid the teaching/learning of mathematics, the Group were invited to answer the question "effective teaching and learning software should ensure that ...".

The following criteria were established by the group:

- use of the software should be transparent to the user
- the user should attain a sense of achievement by using the software
- the software should make full use of visual display capability (colour, graphics etc)
- the software should be "tried and tested"
- users should be encouraged by the software to consider options and make choices at regular stages
- the user should be allowed to respond freely (ie not have to make a choice from pre-defined responses)
- the software should offer different "difficulty levels" at the outset
- the software should include a "help" option ("panic button") to give the user clarification and advice
- the objectives of the software solution should be pre-determined
- the software should not cause too many irritating bleeping noises
- the software should allow precise definitions of the "task" by the teacher
- the user should be given "diagnostic" response by the software
- the user should be given "recap" facilities (return to start; to other pages)
- the software should give summary and detailed feedback to the user
- the user should be given "mapping facilities" by the software
- the software should comment on what the hardware is doing.

INTRODUCTION TO AUTHORING SOFTWARE

There is a need for effective methods of developing material for computer based training systems.

In particular, there is an increasing need for authoring to:

- promote Open Learning, which is widely acknowledged as a method of delivery which provides flexibility and improved utilisation of staff and student time

- improve delivery methodology by incorporating technology and multi-media to enhance the presentation
- allow different areas to be customised to specific needs, so allowing an organisation or individual to fill in the gaps that more traditional methods cannot provide.

Authoring is now viable because of:

- the technological developments in PC technology
- the development of multi-media technology - sound, picture, video
- the reduction in cost of hardware, so making authoring economically viable
- and the need for improvements in the quality of teaching and training.

What makes for good authoring software?

- ease of development of the teaching material - the interface of the authoring system must be highly interactive, and require non-programming skills
- a high level of interaction between user and system including monitoring and assessment of the learner
- interface to multi-media technology - the ability of the systems to use interactive laser disk, CD-Rom, sound and scanned pictures if required.

DEMONSTRATION OF THE SOFTWARE SOLUTIONS

The participants were able to try a number of simple authoring packages. In particular, the overhead displays used throughout the session were generated using IBM's LINKWAY, an authoring solution which is particularly appropriate for presentation purposes.

A number of illustrations of mathematics solutions using LINKWAY were available, which demonstrated the ease of use and effectiveness of simple features such as "pop-up screens" and "go-buttons". More advanced features were discussed after the demonstrations and brought the session to a successful close.

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